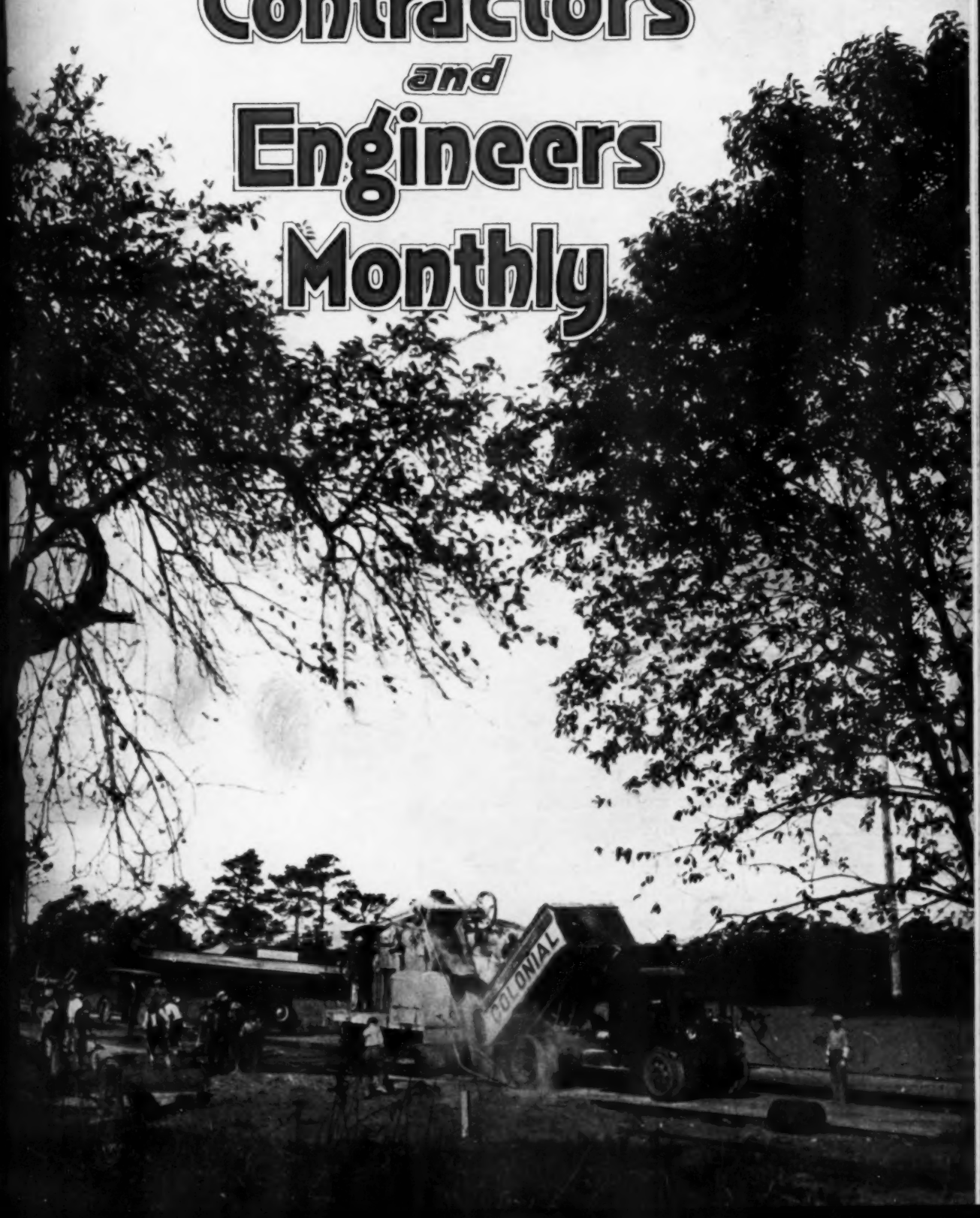
ring Concrete at an Intersection
on the Southern State Parkway
Long Island, N. Y.
See Page 23

7TH TIER

JUNE, 1933
25 Cents, $1 a Year

Contractors and Engineers Monthly



9 EUCLIDS prove their ECONOMY

HARRIS & BRANDENBERG, well known levee Contractors, started the 1932 season with two Euclid 8 yd. wagons. In August they increased their fleet with three of the new 12 yd. wagons. Later on, during October another 12 yd. was purchased. In November, one 12 yd. and two more 8 yd. units were added for a fleet total of 9 Euclids.

With their exclusive fleet of Euclids, they have completed 370,000 cu. yds. of levee work at Sherard, Miss., 150,000 cu. yds. at Green Grove, Miss., and at present are working on a 554,000 yd. job at Jeffries, Miss.

This firm was repaid for its confidence and knowledge of Euclid performance at the recent "levee-letting" on April 18th. They were low bidders on 4,500,000 cu. yds. of levee work. This is the best kind of proof that "lower-cost" estimates can be profitably accomplished with Euclid Equipment.

JOB FACTS

CONTRACTORS - - Harris & Brandenberg.

Type of job - - Constructing a levee at Jeffries, Miss.

Size of job - - 554,000 cu. yds.

Equipment - - One 1¾ yd. LINKBELT and a 1¾ yd. NORTHWEST dragline.—
Eight Model L tractors—four 8 yd. and five 12 yd. EUCLID WAGONS.

FACTS - - Oak flare boards used to further increase hauling yardage of wagons. 8 yd. and 12 yd. wagon hauled in train by one tractor. An average of 165,000 cu. yds. is being moved per working month with a fairly long haul.

Write for other interesting "Job Facts"

THE EUCLID ROAD MACHINERY COMPANY
CLEVELAND OHIO

a discut 13

Playing Chess *with* Grading Equipment

Louis des Cognets & Co. of Lexington, Ky. Made Strategic Moves on Evansville-New Harmony Project in Indiana

JUST as the bishop takes a long diagonal glance across the board and bolsters up your rook, so the various pieces of equipment on the Louis des Cognets & Co. grading and paving job between Evansville and New Harmony, Ind., were used in a strategic manner to carry on the work most effectively with few moves and those happy ones.

The contract was awarded to this organization for the grading and paving of 18 miles of concrete road but 9 miles of the project were subcontracted for grading to another outfit and work pushed on the initial 9 miles by the contractor's own equipment so that paving could start as soon as possible. Grading started March 12, 1932, and the pouring of the slab was under way by the middle of May. It was necessary to move 110,000 cubic yards of dirt on this 9-mile stretch with a maximum haul of 1,500 feet and with cuts running from 12 feet to 2 feet. The fills, which were from 15 feet to 500 feet long, averaged 7 feet deep.

Four Outfits Used for Dirt Moving

Again the analogy of chess comes up for Louis des Cognets had four threats for moving the dirt just as we have queen, rook, bishop and knight. Each piece of equipment had its particular advantage under certain conditions and was used at the proper time.

The first outfit consisted of a Caterpillar Sixty with a train of five 1½-yard Euclid wheeled scrapers, an Allis-Chalmers 75 pulling an Adams No. 12 leaning-wheel grader, a Killefer scarifier, a Caterpillar Twenty motor patrol grader with scarifier and a Huber 10-ton gas roller. This outfit worked under one foreman and was assigned to work where the going was fair. When the clay top soil became too hard, the scarifier was used but in spite of this it was necessary at times to cut down the number of Euclids in the dirt-moving train so that the tractor could pull them at reasonable speed.

The second outfit consisted of a Bucyrus-Erie 1¼-yard gas + air shovel loading to four Dumptors. An Allis-Chalmers 50 with a Baker bulldozer completed the spreading of the dirt which was spotted and initially spread by the Dumptors. Two hand laborers were also used in this outfit. If the haul was short and traction good so that good speed could be maintained with the Dumptors only two of them were used. Naturally this outfit was put into the places where the cuts were suffi-

A Tractor Hauling a Train of Five 1½-Yard Wheeled Scrapers Made Up the Dirt Moving Unit of the First Outfit

cient to make the gas + air shovel work economically against a reasonably high face of dirt.

The third outfit was composed of a Bucyrus-Erie 1-yard steam shovel and four motor trucks which were helped out by two of the Dumptors when conditions warranted. That was the first move of equipment. Other equipment in this outfit was a Caterpillar Twenty patrol grader and an Austin 10-ton gas roller.

Number four outfit, which was used in shallow cuts and was similar to the first outfit, was made up of Western wheelers, six of them with 2-up mule teams and a 3-up snatch team. A plow team completed the outfit.

THE SET-UP AND MOVES

The steam shovel and wheeler outfit were always worked on adjacent cuts and fills so that the Austin 10-ton gas roller could shuttle between the two sections and thus save the expense of a roller for each outfit. Similarly the Euclid and Dumptor outfits were usually kept close enough to share the time of the Huber roller. This is a far more important division of time than many contractors will be willing to admit. Think back and figure the time that you have a roller standing idle on a grading job and a second standing idle on the same work, when a little thought as to the distribution of the work would have made the second roller unnecessary. Or more important, yet, if you had to rent the second roller, that daily expense which could be saved. I am reminded of a job in one of the southern states visited last spring where a roller was standing on the side of the grade. When I asked the contractor where it was used he admitted that it was just window dressing. The specifications required that a roller be on the job for use when the engineer required, so one was rented for a very nominal figure and it stood by the roadside, a sad looking piece of machinery. In fact the roller reached the position at which I saw it and remained there for the duration of the contract because it broke down on delivery by the owner.

But to return to the Louis de Cognets job. In order to speed up the rolling and to insure compaction of the soil around the culverts so that there would be no settlement when the heavy paving equipment was

(*Continued on page 22*)

THE SECOND DIRT-MOVING OUTFIT ON THE LOUIS DES COGNETS & CO. PROJECT

1. *The power shovel loading one of the self-propelled dump-body tractors.* 2. *Transporting a full load.* 3. *A clean dump at a high angle.*

Pouring 3,400 Yards *of* Concrete *with a* 2-Bag Mixer

Dumping the Batch Box into the Mixer Skip

Well-Planned Concrete Plant, Long Distance Buggying, and Form Work Were Features of Princeton, N. J. Sewage Plant Construction

PRINCETON, N. J., is the seat of one of America's great universities located in the hills of central Jersey. One would be led to think of the municipal services as of the highest order and so they are now that Engstrom & Wynn, Inc., contractor of Wheeling, W. Va., has completed the modern sewage treatment plant for the Borough of Princeton. The Borough and Town and the University as well as a couple of schools in the vicinity had six separate sewage disposal plants, all of which were discharging into the 4-foot depth of Lake Carnegie and gradually making a grand open septic tank of the scenic lake.

The new sewage treatment plant which gathers unto itself all of the sewage of the community, formerly more or less satisfactorily treated in the six independent plants, is located in the woods as far from the precincts of the University as possible and is spread over considerable area, making the question of concreting one requiring considerable thought on the part of the contractor. Instead of several small mixers at strategic points with their attendant small stockpiles which are always wasteful, or a single plant with an industrial railroad which might have proved very reasonable if the contractor had already possessed such equipment, —well, instead of all these possibilities the contractor elected to locate a 2-bag Jaeger mixer well up on the hillside where two large bins were built on the ground for trucks to dump the aggregates. The fact that much of the concrete was poured in winter, requiring heating of the aggregates, was the deciding factor for the cental mixing plant. Further, even though the aggregates could have been heated at several points, the problem of getting heavy trucks of sand, gravel and cement to the various mixers would have required plank roadways which were too costly for the yardage of concrete involved.

Runways were built from the central mixing plant to all the separate units of the sewage treatment plant as the time came for pouring the concrete foundations, walls and hopper bottoms. The only structures above the mixers were the primary sedimentation tank with its cover and the sludge digestion tanks. When it came time to pour these an elevator operated by a small hoist was used to raise the buggies the 10 feet to the top of the tanks and then the runways were built there. Fully 350 feet of runway was required when the sprinkling filter was constructed at the most distant point from the mixer and a fleet of 6 buggies were kept on the run. It was noted that the runways were so built that in most cases the loaded buggies ran down grade and the empties upgrade. There was one exception to this in the pouring of the sludge digestion tanks which were close to the mixer and 5 feet above it. This required a helper or pusher when the loaded buggies were on

the way to the forms. This method was cheaper than hoisting for so small a rise.

The Concrete Plant

A short section of light track with a gage of about 4 feet was laid on the ground for a distance of about 40 feet leading to the skip of the mixer. On either side of the track were the bins for the sand and gravel. These bins were equipped with plank bottoms to prevent waste of the aggregate. A 4-wheel car with a dump box on it was run in between the bins and one man on each side shoveled the aggregates into the sections of the box which accurately measured them by volume. The batcher box on the car had adjustable ends to allow for the changing volume of sand and gravel due to moisture content. The box carried a complete two-sack batch. The men who pushed the car back and forth leveled the aggregates off flush with the tops of the two divisions of the box. They then pushed the car forward to the end of the track and tripped the box, dumping it into the skip of the mixer. One man at the skip emptied the required number of bags of cement into the batch before it was raised by the mixer operator. Whitehall cement in cloth bags was used.

Forms Built in Large Panels

Throughout the work 1¼-inch finished spruce was used for the form work and the lumber was run vertically instead of the conventional horizontally. This seemed to give a much better finish and from the operating standpoint of the sewage treatment plant it will provide fewer places where sludge can accumulate and become septic.

The sprinkling filter which is nearly 9 feet deep is 151 feet wide by 260 feet long and, as it is planned to be able to flood the entire bed of stone to check nuisance from the sewage fly if necessary, a wall of considerable length was built around the entire filter. The forms for this wall were built in panels 9 feet high and 50 feet long and were reused from seven to eleven times. It was necessary to cut the panels into shorter sections after they had been used several times both because of wear and tear and also so that they would fit into the odd lengths of the wall. These panels were also built with the lumber running vertical and the wales horizontal.

A considerable part of the concrete work on this plant was poured during the winter which, though generally mild in this territory, was sufficiently cold to necessitate the heating of the concrete aggregates and the water. A boiler set up close to the mixer heated the water and grilles of pipes beneath the aggregates in the bins kept them warm. The concrete as it came from the mixer was from 70 to 80 degrees temperature and was kept warm in the forms for at least 48 hours after pouring by covering the forms with tarpaulins and running live steam under the covering. The concrete was kept at a temperature of 70 degrees Fahrenheit for this period.

Personnel

Engstrom & Wynn, Inc., Wheeling, W. Va., was the contractor for the sewage treatment plant with E. M. Barnes as Superintendent. For the Borough of Princeton, I. Russell Riker was Resident Engineer. Nicholas S. Hill, Jr., was Consulting Engineer for the design, preparation of plans and specifications and general supervision of construction.

Boulder Dam Intake Gates Provide 250,000 Man-Hours of Work

MORE than 250,000 man-hours of work will be furnished by the construction of the Boulder Dam cylindrical gates, on which work was recently started in the East Pittsburgh plant of the Westinghouse Electric & Mfg. Co. Two hundred men will be engaged for the next six months in building the gates. Furloughed employees have been recalled for the work and no new men are being hired.

Each of the eight cylinders will be 32 feet in diameter, 8 feet high and will weigh 240 tons. Almost 4,000,000 pounds of steel castings, electric arc welded steel plate, bronze, copper, monel metal and other metals will go into their construction. Because of the great size of the cylinders, they will be made in electric arc welded segments and shipped to the dam where they will be assembled. It is estimated that 96 freight cars will be required for the 2,000-mile rail journey.

These metal cylinders will act as valves to control the amount of water to the 1,000,000 horsepower of water-wheel turbines. The cylinders will be located in masonry towers approximately 300 feet deep, situated in the lake above the dam which itself is 730 feet high. There are four such towers and two cylinders per tower, one above the other. A series of windows on a level with the cylinders will extend around the towers. When a cylinder is raised within a tower, the windows opposite the cylinder are uncovered and water is allowed to enter. From the towers the water will flow through 30-foot tunnels to the power plant.

General View of the Princeton, N. J., Sewage Treatment Plant During Construction Showing the Layout of the Concrete Plant and Runways

Protecting Profit *in* Bad Weather

By
J. L. Harrison
Senior Highway Engineer
U. S. Bureau of Public Roads

HAZARD which every contractor faces whenever he undertakes work which must be handled out of doors is that of bad weather, *wet* weather in particular. This is a fact so generally recognized that it requires neither comment nor explanation. But while both engineers and contractors agree that bad weather is a serious hazard in all out-of-doors construction work, some comments tending to show just why work done during such weather is so commonly unprofitable may, perhaps, assist contractors in reducing the losses so often taken on this account.

In order to indicate more clearly the nature of weather losses, it may be well to draw attention to the fact that in construction work, as in many other activities, costs accrue in two separate and clearly distinct fields which may be defined as the "production field" and the "expense field."

Basically, construction work is a phase of manufacturing and, in common with other phases of manufacturing, involves the use of labor, equipment and materials out of which some kind of a new product is obtained. Normally, the new product is marketed for more than the labor, the equipment values and the material used in producing it, and if this condition prevails, the difference is the gross profit the conversion has produced.

It is immaterial whether this relationship is set up for the work as a whole or on a unit basis. For some purposes one set-up is better, and for some purposes the other is more satisfactory. Adopting the first basis for the moment—that is, assuming that the gross profit is for the whole undertaking,—it is apparent that a considerable number of expense items must be covered out of the gross profit before the net profit is obtained. Nothing much would be added to this discussion by considering these expense items in detail, but in order to clarify the situation somewhat farther it may be remarked that getting onto the job and getting ready to operate, cleaning up and getting off the job, head office expense, bonds, insurance, etc., as well as the cost of weather losses, breakdowns, and similar items are expense and that, as expense, they reduce the amount of the profit which, except for such costs as these, would be available as net profit.

Put in a little different way, all profit originates in the difference there is between the cost of the labor, material and equipment required in order to obtain production and the price that can be had for the product. But, this being the case, the question as to whether a net profit will be secured depends on two entirely distinct matters, of which the first is the margin between production cost and selling price, which determines the gross profit, and the second is the amount of the expense which must be taken out of the gross profit before the net profit is reached.

Weather vs Net Profits

With this background, it is possible to bring out the effect of weather on profit, by which term the contractor and the engineer usually mean net profit, and in order to make the relationships which exist as clear as possible, the construction of 100,000 square yards of concrete pavement will be considered for the purpose of illustration. Any other type of construction work would show about the same facts.

Proceeding with the illustration, Contractor A secures 100,000 square yards of concrete paving at $1.23 a square yard, the gross value of the work to be done being $123,000.00. He assumes that he can lay an average of 2,000 square yards a day, making the project a 50-(production) day job. His set-up is as follows:

ASSUMED PAY ROLL

		Cost per day When at work	When idle
1	Superintendent (straight time)	$ 12.00	$12.00
1	Timekeeper (straight time)	4.00	4.00
1	General foreman (straight time)	8.00	8.00
5	Foremen (strtaight time)	30.00	30.00
12	Truck drivers	56.00	....
1	Turntable operator	3.00	....
1	Crane operator (straight time)	10.00	10.00
6	Cement handlers	21.00	....
1	Batcher operator	3.00	....
1	Finishing machine operator	4.00	....
2	Finishers	10.00	....
1	Mixer operator (straight time)	6.00	6.00
3	Puddlers	10.50	....
1	Form setter	5.00	....
1	Roller operator	4.00	....
1	Tractor operator	4.00	....
1	Pump tender (straight time)	3.50	3.50
30	Laborers	90.00	....
72		$284.00	$73.50

ESTIMATE OF COST

Labor—50 days at $284.00	$ 14,200.00	
Materials	81,700.00	
Operation of equipment (including depreciation)	9,800.00	
	$105,700.00	
Bid price (100,000 square yards at $1.23)		$123,000.00
		105,700.00
Gross profit		$ 17,300.00
Central office expense	$ 3,000.00	
Getting onto job	2,700.00	
Clean up	1,000.00	
Bonds and insurance	3,100.00	
Weather and miscellaneous losses	1,500.00	
	$ 11,300.00	
		11,300.00
Expected net profit		$ 6,000.00

THE EXPENSE OF CLOSING DOWN A JOB

Taking the above set-up, then, as accurate in principle though somewhat lacking in detail, it is apparent that in order to secure the net profit of $6,000 it is necessary, first, to keep the production cost down to $105,700, and, second, to keep the total general expense down to $11,300. On the other hand, the structure of the organization is such that every idle working day costs $73.50. Even if no work is done, the straight-time men must be paid. The exact details are of less importance than the fact that current practices commonly result in rather important expense on this account whenever the work is closed down. Naturally the daily rate of this expense varies from job to job as it does from one type of work to another. Where horses or mules are used on construction work, the daily expense during wet weather and during other periods when no work is done is further increased by the fact that these animals must be fed whether they work or not. Such costs as these are out-of-pocket costs and represent the expense the contractor has to meet even though nothing at all is accomplished. Part of this expense, as feed for stock, is quite unavoidable if stock is used. Part of it, that is the payments made to straight-time employees, is in the interest of securing and holding high-grade men in key positions. Finally, some of the expense a contractor may have to meet is partly a matter of custom and partly a matter of necessity. But, whatever the exact reason for any particular item in the list of idle time expenses, they all have the effect of placing a major part of the cost of any delay on the contractor.

WET WEATHER WORK QUESTIONED

The expense of closing down a job, as outlined above, includes only the cost of the visible, tangible expenditures. Rather often even larger costs are developed by the practice of keeping as many men at work as possible during wet weather under the mistaken impression that any work that is done is of some advantage. Thus if the mixer is idle, working on some subsidiary operation, as on the preparation of subgrade, merely serves to throw the job out of balance, for if the crew is properly organized, the regular subgrade gang is able to prepare the subgrade as fast as the mixer can cover it. To prepare any of it when the mixer is idle can only lessen the work the subgrade gang will have to perform during the first few days after work as a whole is resumed. In cases of this sort there is an appearance of valuable effort but it is only an appearance, for if the actual result is merely to permit some group to loaf for a time after work is resumed, there has been no accomplishment of any real value to the contractor. Losses from this cause are numerous, but unless each case is analyzed separately the amount wasted cannot be very accurately determined, for while it is quite generally true that work done while the principal producing unit is idle is without value, there is just enough extra work involved in preparing to run after a storm so that it cannot properly be said that all such work is wasted. At least in the highway field, it is safe to say that the losses caused by trying to work in wet weather have been much greater than contractors commonly suppose.

WASTED EFFORT INCREASES LOSSES

On the other hand, whatever work is required because of damage done by a storm is an expense properly chargeable to the weather. To discriminate between work required by reason of damage, etc., resulting from a storm and the work so often done on some one item in a production series which really is wasted effort, may seem to some to be more theoretical than practical. However, this is not altogether the case for the required work is an unavoidable expense, while weather losses may be reduced by avoiding expenditures under the second category, though for purposes of accounting and in studying weather losses, all expense incurred for labor, operation, etc., while the principal producing unit lies idle because of the weather should usually be considered as loss due to bad weather.

Reverting to the paving job which is being used as an illustration, it is apparent that without regard to any indirect losses which may result from paying men to do work that ought to be done only when the whole outfit is functioning, a week of wet weather will cost the contractor some $500, and that if during the working season there are six weeks of bad weather, not a usual condition but not one by any means unknown, net profit will be sharply reduced.

WET WEATHER LOSSES ARE NOT SMALL

The points it is desired to bring out in this way are first, that as a general thing the direct expense of wet weather is greater than is commonly supposed; and second, that this expense is a direct draft on net profit. Whatever this expense is, it must be paid and as the only source from which it can be paid is the gross profit, its payment unavoidably results in a reduction in the amount of the net profit. Under current conditions, net profit never is very large, so it follows that *the prospect that bad weather may convert a possible net profit into a certain net loss always is of real importance to the contractor.*

(To be continued in the July issue)

Fine Form Work

H. L. Maas & Sons

of Baltimore

Produced

Excellent Finish

on Railroad Overpasses

in Elkton, Md.

WITH the electrification of the Pennsylvania Railroad system north from Washington, steps are being taken to eliminate as many grade crossings as possible. A pair of crossings and a complete change of location of the main line tracks were completed last year at Elkton, Md. The entire cost of the relocation of the railroad and half of the cost of the overpasses was borne by the railroad and the remainder by the State Roads Commission. The two overpasses, one at North Street and the other at Bridge Street, were quite similar in construction and so the Bridge Street overpass will be described. Some of the illustrations are of the North Street overpass taken to give a complete idea of the methods of handling the work and the forms.

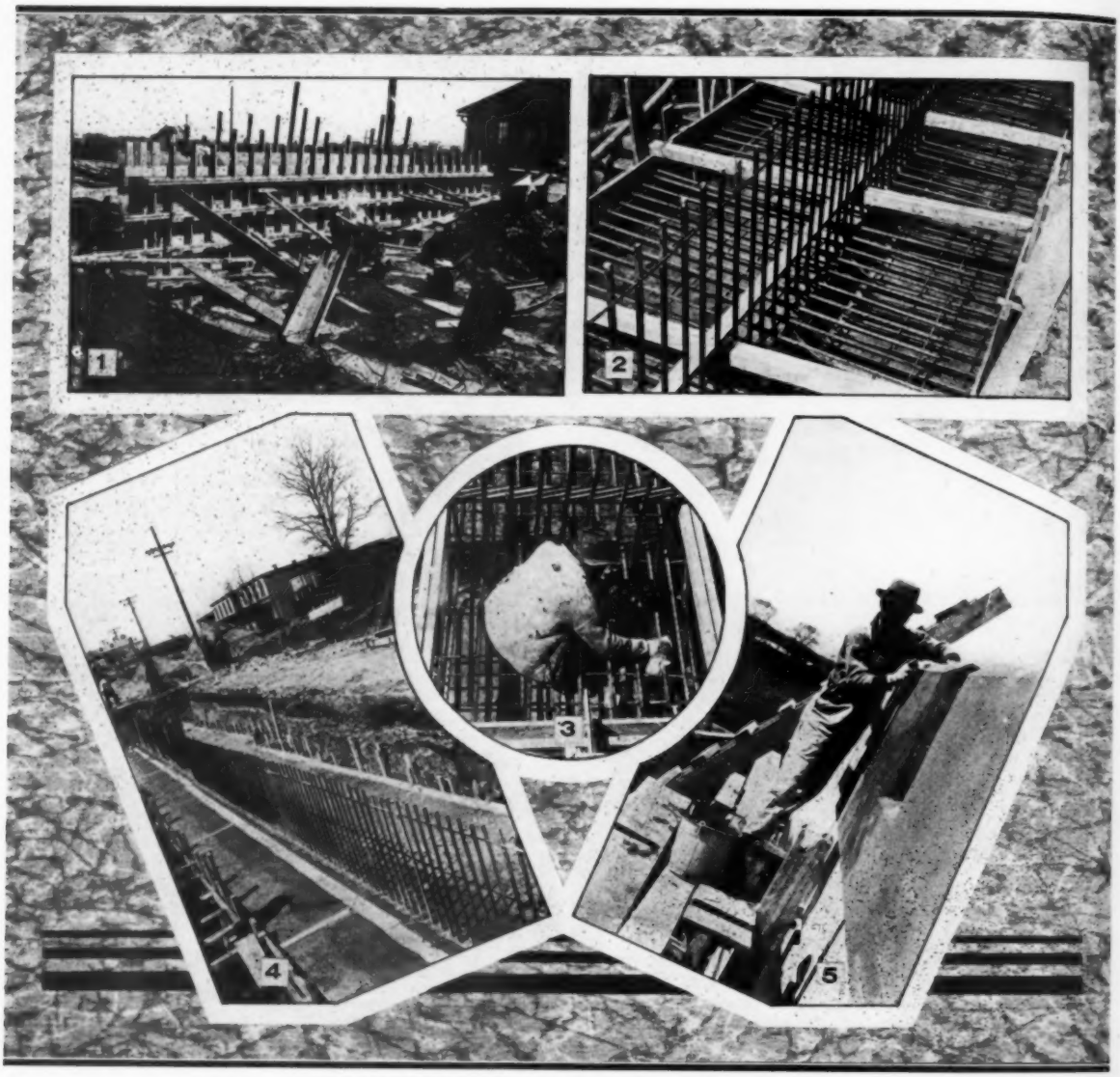
The Bridge Street overpass consists of a counterforted retaining wall and five 3-column bents on the south side and seven similar bents on the north side. There are well-designed and attractively finished abutments at the railroad with the individual structures connected with decks of slab and beam construction. The columns of the bents are circular, 36 inches in diameter with an arched beam connecting them. The foundations of the bents and walls were carried down through a gravel strata into stiff clay which, at a depth of about 15 feet, was underlaid with gravel. The retaining walls were drained at about 3 feet above grade with tile weeps and the walls backfilled with 1 foot of stone against the walls. Then a tamped clay fill was spread in 12-inch layers and rolled with a 10-ton roller. The weeps were placed at 20-foot intervals in both walls. Before the placing of the fill, the interior of the walls was sprayed with Protectar with a hand pump, long delivery hose and about 6 feet of pipe with a hand control at the hose end and a spray nozzle at the other.

The bulk of the excavation for the retaining wall foundations and the column bents was done with a Byers Master crane with a 1-yard Blaw-Knox clamshell bucket. The footings were trimmed by hand with intermediate shovelers where the depth was too great for one lift.

Building the Forms

The form lumber was 1 1/16 x 8-inch shiplap with 2 x 6-inch studding and 1 x 10-inch boards for backing. Universal form ties with straps instead of rods were used throughout the work. Because of the number of holes in the forms for the clamps, a Black & Decker electric drill was used by the carpenters on the higher forms.

In making the forms for the columns up to the spring line of the arch standard, 20-gage metal Kalman column forms were used. Then under the copings of the arch, wood templates with 13-inch centers and lined with 22-gage metal with butted joints were used.



FROM FORMS TO FINISHED RETAINING WALL

1. The start of a form for a retaining wall; also showing one of the drainage pumps. 2. Reinforcing for the footing of a retaining wall. 3. Cleaning the reinforcing steel before pouring. 4. The finished footing. 5. Hand-rubbing the wall to a smooth finish.

LABOR ORGANIZATION

On hand excavation a crew of 30 to 40 laborers was used while the carpenter crew on the forms varied from 35 to 40 and the steel crew from 8 to 10 men.

Because of infiltration from the upper gravel strata it was necessary to keep one or two pumps at work all the time while excavation and form work were in progress. A Fairbanks-Morse and a Carter Humdinger contractor's pump were used for this work.

CONCRETING

All of the concrete was mixed in a Smith 27-E paver which was moved about the job to minimize the hauling of the mix. The aggregates were hauled in a fleet of 4-batch trucks, varying from two to five, depending on the size of the pour for the day. The aggregates were furnished by the Arundel Corp. from its plant at Northeast, Md., a distance of 6 miles from the job. The batches were made up at the plant where the State had an inspector stationed. Two classes of concrete were used; Class A, approximating a 1:2:4 mix for all retaining walls, footings and superstructure, and Class B approximating a 1:2½:5 mix for the reinforced footings in the bents. All cement for the work was furnished by the State.

For the footings the concrete was chuted from the mixer with two lengths of regular concrete chutes and for the walls and abutments it was handled by a 1-yard Stuebner bottom-dump concrete bucket by the Byers Master crane with a 45-foot boom.

FINISHING

The forms were stripped within 48 hours where the structure carried no load and not until 14 days for the

slabs and beams. The exposed concrete work was rubbed with No. 16 Carborundum stone after pointing up the tie holes. After the concrete had reset, it was rubbed with a No. 30 stone. When the concrete could not be rubbed until a few days after the stripping of the forms and hence was much harder, it was rubbed with the Carborundum stone in a Nedco electric rotator.

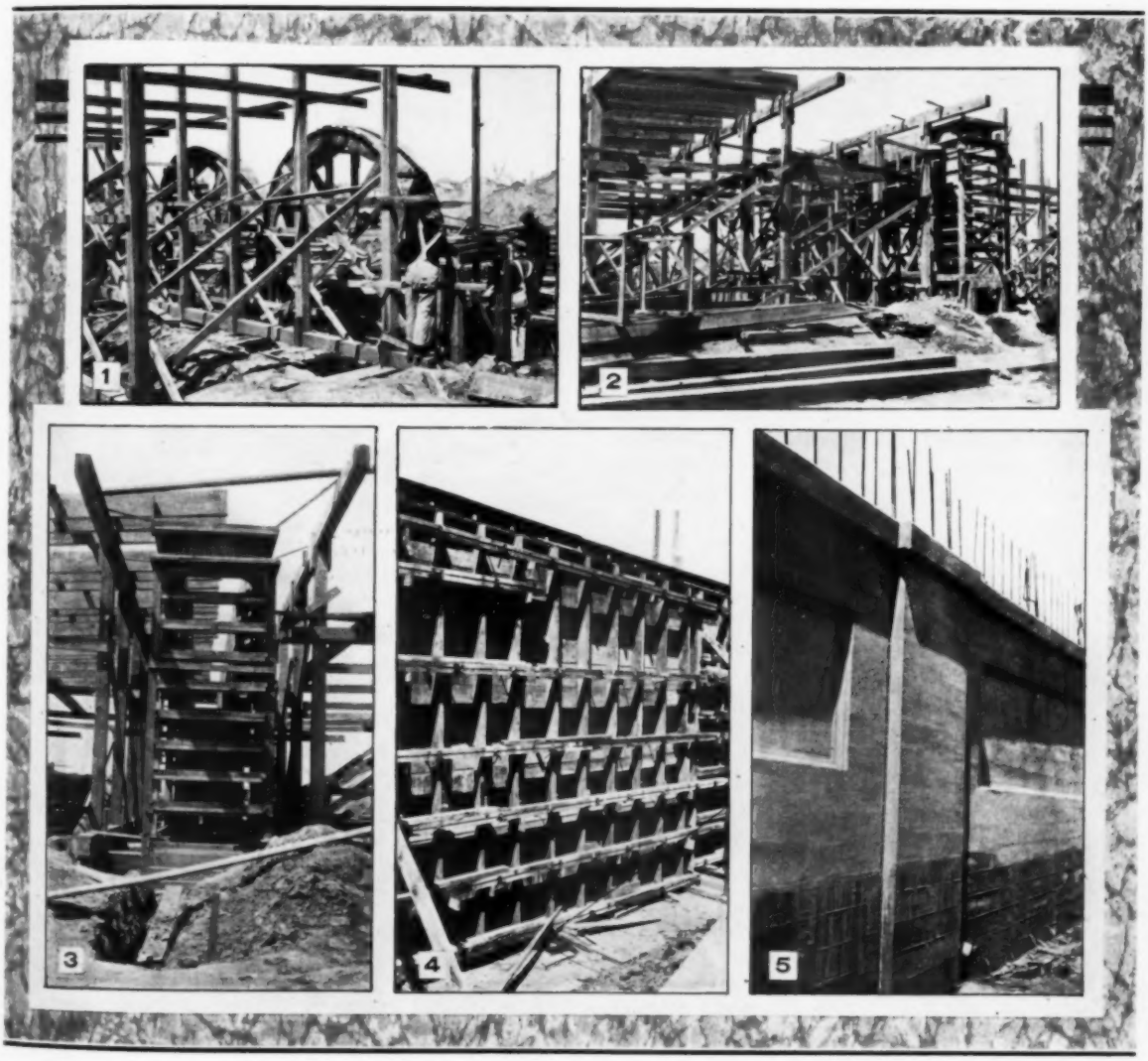
STEEL WORK

The regular steel work which was encased in concrete included 36-inch floor beams, 30-inch sidewalk beams and 10-foot 6-inch plate girders measuring 11 feet 1⅞ inches with the concrete encasing. The steel work was let as a separate contract, which included 255,000 pounds of fabricated structural steel at 3.08 cents per pound and 13,000 pounds of steel castings at 7.7 cents per pound. This contract was awarded to the Phoenix Bridge Co. of Phoenixville, Pa.

QUANTITIES AND UNIT PRICES

The following quantities are for the Bridge Street overpass alone which was slightly longer than the North Street overpass.

Excavation	5,300 cubic yards	$ .38
Borrow	100 cubic yards	.55
Stone backfill	400 cubic yards	3.00
Class A concrete	3,200 cubic yards	11.15
Class B concrete	1,600 cubic yards	5.50
Class A concrete for balustrade	170 cubic yards	20.00
Deformed steel bars	625,000 pounds	.0325
Wire mesh	2,600 square feet	.05
Wire rope for guard fence	400 feet	.75
Conduits in place	Lump sum	1,190.00
Concrete pavement	2,200 square feet	1.28
8-inch corrugated metal pipe	15 feet	12.40
15-inch cast iron pipe	3 feet	4.50
36-inch cast iron pipe	1,095 feet	7.75
Concrete curb	600 feet	.46
Approach sidewalk	300 square yards	1.00
Gunite	5,500 square feet	.355
Protective coating	Lump sum	430.00
Cast iron downspouts	150 feet	1.00
Drop inlets	7	60.00
Combination drop inlet	1	80.00
Combination drop inlet, Type G	1	50.00



FORM WORK ON THE NORTH STREET OVERPASS, ELKTON, MD.

1. Start of forms for a column bent. 2. Completing the forms for another similar bent. 3. End view of forms showing lining. 4. A section of the retaining wall forms set up with clamp and strap ties. 5. A detail of the completed paneling on the retaining wall.

Spraying the Tar Waterproofing on One of the Retaining Walls

THE NORTH STREET OVERPASS

The North Street overpass was built as a skew bridge over the railroad. An incidental comment on the arrangement of the work to cut down the rehandling of excavation is timely. The excavation from the pits for the foundations of the bents was piled alongside, far enough away to permit the mixer to travel through. Then when the bents were completed and the decking in place, the material was thrown under the structure and graded so as to shed water. In the case of the retaining wall at the south end of the Bridge Street overpass which ran close to the existing tracks of the railroad, the wall was built in two sections. The higher section which was farther from the existing railroad was built first and then the excavation from the footings for the lower section was moved ahead and used for fill within the higher retaining wall.

PERSONNEL

These two contracts were awarded to H. L. Maas & Sons of Baltimore, Md. S. H. Hughes was General Superintendent on the two overpasses and A. A. Raphel was Superintendent in charge of the work at Bridge Street. For the State Roads Commission of Maryland, Edward Amick was Inspector in charge of the two jobs and E. C. Rogers was Bridge Inspector on the Bridge Street overpass.

Playing Chess with Grading Equipment

(*Continued from page* 14)

brought up and run over the culverts, I-R pneumatic tampers were used on all earth placed around the culverts and up to the top lift. Then the heavy 10-ton rollers could roll the top layers with the assurance that they would not mire or damage the culverts. The rolling against the culverts was watched very carefully at all times.

LOOKING FORWARD TO THE PAVING

Louis des Cognets & Co. can be relied upon to try anything that is new in the way of methods, but not in a haphazard way. The method is carefully thought out first, analyzed and then put into effect. Witness the unusual way of handling concrete from a central mixing plant on the Clendenin, W. Va., job described in these pages in January, 1931. The Evansville-New Harmony, Ind., job was the first bulk cement job of this organization and they gave a great deal of thought to the manner of handling this material. The final decision was the use of KoneKarts, loaded in the cement box cars, pushed out to the scales and thence to the dumping platform over a pit through which the trucks drove.

PERSONNEL

This 18-mile grading and paving job was completed by Louis des Cognets & Co., of Lexington, Ky., with the exception of the 9-mile grading section that was done by subcontract. For the general contractor, Howard Guyn was General Superintendent, R. O. Cochran, Superintendent and Z. X. Bennett, Engineer. For the Indiana State Highway Department, F. E. Crecelius was Resident Engineer and Lou Wilkonson, Inspector.

One Paving Job Aids 29 Counties

A VERY interesting example of how money spent on highway work spreads to aid people in a wide area in the form of wages and rentals of trucks, teams and other equipment has been shown by an analysis of a typical paving job now under construction in Faribault and Blue Earth Counties, Minn. This job, the paving of 17.5 miles between Blue Earth and Amboy, now half completed, has already given employment to men from 29 counties, has put nearly $33,000 in circulation in those counties in the form of wages and has paid owners of trucks and teams an additional $35,000.

The Blue Earth-Amboy project is one of thirty-eight highway jobs begun last fall in Minnesota with emergency Federal Aid funds. The total amount spent on this particular project up to February 25, 1933 was $103,000 of which approximately $68,000 went directly into wages, salaries and rent of trucks, teams and similar equipment. Common labor for this project was made up of needy unemployed taken from 29 different Minnesota counties. Nearly 650 men from these counties were given work. When spring permits construction to continue, others will be put on the job. On the thirty-seven other emergency Federal Aid highway projects in various parts of Minnesota, other counties contribute common labor from the ranks of their unemployed.

This is an outstanding example of the tremendous value of emergency Federal Aid funds and of the fact that highway construction is outstanding in furnishing aid to a wider group of unemployed than any other expenditure of government funds. Further, the advantage of highway work is that it is supported by the trucks, busses and motor cars which reap direct benefits from the improvements in the highways. Real estate owners are not taxed for state trunk highway system construction.

A Link-Belt Diesel Shovel Loading a Mack Truck in the Construction of the Bouquet Canyon County Road North of Los Angeles, Calif.

Paving

Southern State Parkway

Binghamton Construction Co., Inc. of Binghamton, N. Y. Pushed Through Its Contract on Long Island, N. Y.

EARLY last summer, the New York State Department of Public Works awarded the contract for the construction of Section 5, Part 4A, Section 6A, Section 7, Part 1 and the entrance to the Southern State Parkway in Nassau and Suffolk Counties on Long Island, N. Y. This contract was awarded on June 21, 1932, and called for completion on October 15, 1932. Among the particularly interesting features of this job were the delivery of bulk cement in tank cars, the close-knit organization for the paving operation and the method of applying the asphalt emulsion for curing.

Preparatory Work

Under other contracts several particularly attractive stone-faced bridges were built to carry cross-roads over the Southern State Parkway and most of the heavy grading was done by the same contractor. The Binghamton Construction Co. used two Bucyrus-Erie 1½-yard gas shovels and one Bucyrus-Erie dragline with a 1-yard bucket. These pieces of excavating equipment were each served by three hired trucks which hauled the spoil an average of 1,000 feet. No rock was encountered as Long Island has chiefly a sandy loam soil. On the rough grade a Rome power grader with a 12-foot blade was used, and two Caterpillar Thirty tractors with LaPlant-Choate bulldozers handled the spreading of the material on fills. Each shovel had one pit man, and there were two hand laborers on the dump.

Fine Grade

The power grader was used to cut the form trench and six men were used in final trimming and setting of the 8-inch Heltzel forms which were maintained from 1,000 to 1,500 feet ahead of the paver. A Lakewood subgrader was pulled over the forms by one of the tractors to trim the grade to proper contour. Two men were used for tamping the forms and five men hand-shoveled the windrows from the subgrader to low spots or outside the forms. One handy man oiled the forms, attended to the lubrication of the mixer and moved the hose on the Rex 27-E paver. A Huber 8-ton gas roller was used in compacting the grade ahead of the final grading operation.

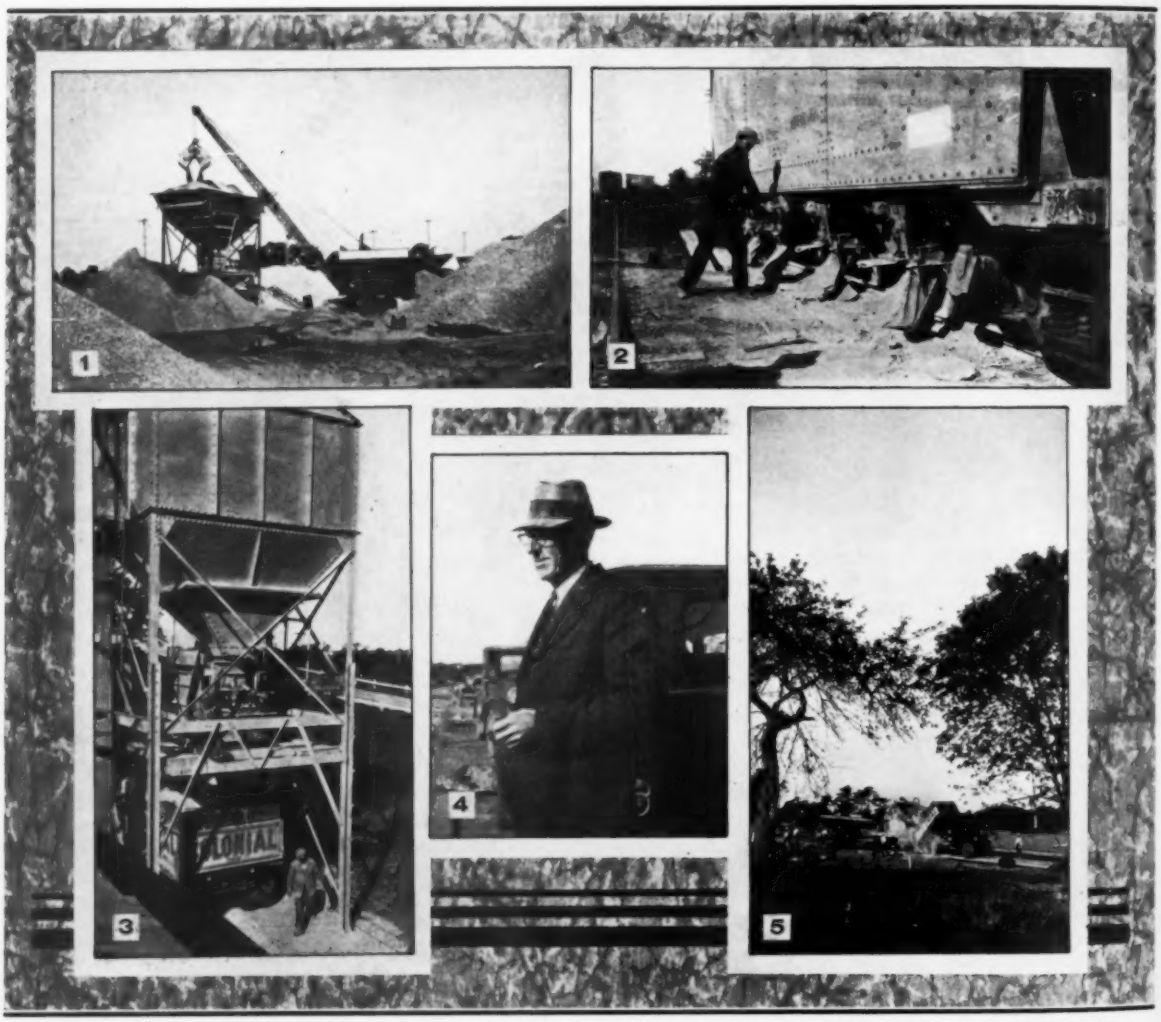
One of the interesting tools which the superintendent called a "rolling tool box" was a 2-horse lawn or fairway roller, the horizontal frame of which was boxed and

carried the sledges and pins for the expansion joints, as well as numerous other odd tools. The expansion joint men pushed it ahead on the grade, thus using it both as a roller and a tool box. The expansion joints were composed of ¼-inch Carey Elastite premoulded joint material and were set by two men who also handled the barmat reinforcing. One man with a scratch board immediately ahead of the paver checked the final grade and corrected even the slightest depressions or high spots.

THE BATCHING PLANT

The contractor purchased the batched aggregate from the Central Park Sand & Gravel Co., a subsidiary of the Colonial Sand & Gravel Co., which has plants scattered over a large section of Long Island, N. Y. The aggregate producer had a 3-compartment Blaw-Knox bin which was loaded from large stockpiles by a Bucyrus-Erie crane with a 51-foot boom and a 1¼-yard Hayward clamshell bucket. The individual batches averaged 1,558 pounds of coarse crushed stone, 994 pounds of fine stone and 1,383 pounds of sand.

A Butler bulk cement plant was set up by the contractor about ½ mile from the sand and gravel pit and on a siding of the Long Island Railroad. The Hercules and Dragon bulk cement were delivered in rectangular steel tank cars, averaging 418 barrels of cement per car. Each car had four dumping doors or chutes along each side coinciding with the openings in the Butler screw-feed bulk cement handling unit. A longitudinal screw in a steel casing was laid beneath the ties just outside of each rail, carrying the bulk cement to a central transverse screw which delivered the cement to the vertical elevator. The bulk cement plant was electrically operated by a motor on a 220-volt circuit, except for the elevator which was run by a small gas engine. The cement batches were 658 pounds each. This plant unloaded an average of 1½ cars of bulk ce-



BATCHING OPERATIONS FOR THE BINGHAMTON CONSTRUCTION CO. CONTRACT IN NASSAU AND SUFFOLK COUNTIES, N. Y.

1. The Colonial Sand & Gravel Co.'s aggregate batching plant. 2. Unloading a tank car of bulk cement. Pounding of the car chutes was necessary to start the cement from the car into the screw-feed handling unit alongside the tracks. 3. The electrically-operated bulk cement batching plant as seen from the top of one of the tank cars. 4. C. B. Carris, Superintendent for the contractor. 5. Converting the batches into concrete slab on the road.

SOME DETAILS ON THE SOUTHERN STATE PARKWAY CONTRACT

1. The "rolling tool box" with its load of miscellaneous tools and materials parked on the subgrade. 2. The spraying machine for applying the asphalt emulsion for curing shown in action. 3. One of the many artistic bridges and, in the foreground, peat moss and agricultural equipment for preparing the earth slopes for seeding.

ment in 8 hours. The cars were moved and spotted by a Linn tractor loaded with gravel to give it the necessary traction for handling two and three loaded cars at one time.

PLACING AND FINISHING THE CONCRETE

The 3-batch trucks of the Colonial Sand & Gravel Co. had an average haul of 2½ miles from the aggregate batching plant to the cement batching plant and thence to the road. They turned at convenient points on the shoulders or at intersecting roadways where sections of the steel forms had been removed and backed to the paver, where one man handled the dumping of the individual batches and generally cleaned up. Two men spaded along the forms and expansion joints, and, aided by the four puddlers, pulled the hand strike-off which leveled the concrete to 2 inches below the top of the forms for the placing of the reinforcing. As soon as the second course was placed the Lakewood finishing machine smoothed it off, with the operator shoveling to the strike-off.

The hand-finishing crew included two men cleaning the slab adjacent to the new pour, two men on the longitudinal float and three hand finishers who used the 10-foot checking straight-edges, pulled the caps on the expansion joints, broom-marked the slab and edged both the joints and the sides against the forms. The finishers had two 10-foot wooden straight-edges and one 5-foot straight-edge. One of the 10-foot straight-edges was used as a drag and the others as checking straight-edges. The 5-foot straight-edge was slotted for use over expansion joints, which were placed flush with the pavement surface and trimmed after expansion caused them to rise above the surface.

SPRAYING OUTFIT FOR CURING

The contractor developed a very effective machine for applying the asphalt emulsion, Curcrete, for curing the slab. The basis of the machine was the standard Curcrete tank and pump with rubber air and Curcrete hose but instead of applying the asphalt emulsion from a single nozzle, a frame was built, carrying 13 nozzles, and mounted on two 20-inch diameter disc wheels with rubber tires. A third wheel, shown in the illustration, was mounted on the handle and was dropped to the pavement to give the proper angle for the application of the asphalt while spraying. Between the sprays and the disc wheels a galvanized iron shield was inserted with a rubber skirt at the bottom. Two men handled the Curcrete outfit, one on the tanks and pump and the other handling the spray unit. The asphalt was applied at the rate of 0.10 gallon per square yard in a single application in strips 10 feet wide for curing, and an additional application of 0.08 gallon for color.

The water supply for the paver and for sprinkling the grade ahead of the paver was taken from a small pond and delivered by a C H & E triplex pump through 2½-inch and 2-inch galvanized pipe in which taps were inserted every 400 feet. A pump man was in constant attendance at the pump. The Rex paver carried 250 feet of 2-inch paver hose.

Two men spread the burlap cover on the green slab as soon as the finishers had completed their work. The burlap was removed by the two Curcrete operators ahead of their work, folded and tossed aside to be picked up by the service truck and carried ahead.

QUANTITIES AND UNIT PRICES

	Item	Quantity	Unit Price
1S	Clearing and grubbing	Lump sum	$330.00
4	Unclassified excavation	35,000 cubic yards	.18
4B	Trench and culvert excavation	22,000 cubic yards	.25
6	Overhaul	450,000 station yards	.003
7	Trimming shoulders	2,100 linear feet Rd.	.10
8	Preparing fine grade	90,000 square yards	.04
13	Cast iron pipe 18-inch	100 linear feet	2.00
14A	Reinforced concrete pipe 18-inch	2,100 linear feet	1.50
14B	Reinforced concrete pipe 24-inch	1,380 linear feet	2.25
14C	Reinforced concrete pipe 36-inch	4,200 linear feet	3.65
15B	Portland cement	35,600 barrels	1.40
15H	Special portland cement	300 barrels	2.40
20	First class concrete 1:2:4 mix	325 cubic yards	11.30
23S	Stone masonry	7 cubic yards	25.00
25	Metal reinforcing for concrete pavement	85,050 square yards	.20
26	Bar reinforcing for concrete pavement	11,400 pounds	.06
27	Metal reinforcing for culverts	250 square feet	.12
28	Bar reinforcing for structures	7,600 pounds	.04
30	Miscellaneous iron and steel	72,000 pounds	.045
32A	Rustic timber guide rail A	760 linear feet	1.40
32B	Rustic timber guide rail B	2,300 linear feet	.45
32C	Rustic timber guide rail C	250 linear feet	1.10
32S	Resetting rustic timber guide rail	800 linear feet	.30
42S	Gravel pavement "run of bank" gravel	460 cubic yards	2.00
47S	Cement concrete pavement	18,900 cubic yards	5.20
74	Bituminous material T cold application	3,700 gallons	.13
77P	Protection of traffic	Lump sum	550.00
78S	Maintenance of 2-way traffic at Mill	Lump sum	110.00
80A	Grouted rip rap	2 cubic yards	15.00
95B	Broken stone, L. M. No. 1 size	10 cubic yards	4.00
93CD	Broken stone, L. M. Nos. 2, 3	10 cubic yards	4.00
97S	Concrete curbing, Special	36,300 linear feet	.40
102AS	Catch basins, Type A Special	28	125.00
102BS	Catch basins, Type B Special	8	60.00
110	Top soil	3,600 cubic yards	.40
110S	Placing top soil	24,000 cubic yards	.35
111	Seeding	22 acres	130.00
112	Cinders, loose measure	800 cubic yards	1.50
113	Salvaging rustic timber guide rail	120 linear feet	.20
114	Peat moss	4,650 bales	1.40
	Total		$256,849.50

PERSONNEL

The Binghamton Construction Co., Inc., Binghamton, N. Y., contractor for this 2.95 miles of concrete construction, operated two 6-hour shifts during daylight saving time and one 8-hour shift after daylight saving time was discontinued. The production under these two conditions is of interest. Under daylight saving condition with the two shifts, 450 cubic yards of concrete was placed while 300 yards was placed on the single 8-hour shift. For the contractor, the work was in charge of C. B. Carris, Superintendent, and for the New York State Department of Public Works, the work was done under the direction of J. J. Darcy, District Engineer, A. D. Greenman, Construction Engineer with E. C. Hackett, as Engineer-in-Charge.

Paint Specifications of State Highway Departments

A COMPREHENSIVE study of the paint specifications of forty-five state highway departments has recently been completed by the Lead Industries Association. Of the forty-five sets of specifications covered, forty-one are definite as to the paints to be used for priming or shop coats on structural steel. Thirty-two require pure red lead paint and five more include it as optional. Pure blue lead paint is optional in four states.

No state allows the use of any paint for priming or shop coat on structural steel that is not either pure red lead, pure blue lead, or a high proportion of either.

A study of paints specified for field coats is more complicated because of the greater latitude allowed through alternative formulae, necessitated by color and other requirements. For first field coat thirteen out of forty states require pure lead paints and nine more include them as optional. Nineteen states either require or permit lead-zinc paints and five more allow red lead or blue lead paints containing high proportions of the lead pigments. In the case of finish coats, twelve states either require or allow pure lead paint, twenty-two states lead-zinc paints, and eleven permit paints containing considerable quantities of red lead.

One very important point is the composition of the white lead-zinc oxide paints specified. The average of all these paints is over 70 per cent white lead. This indicates the high proportion of white lead which engineers feel must be included in mixed paint to give satisfactory results, and places the white lead content higher than is found in any but the best mixed paint.

State Highway Department specifications for timber paint are also interesting. Only one state out of forty-one fails to specify a lead base paint. Nine specify pure lead paints either for the priming coat or all coats and thirty-seven states specify white lead-zinc oxide paints. Only seven states definitely allow other than lead paints as alternatives.

The widespread use of pure lead paint, or paint containing a high percentage of white lead, on so many state highways of the Union with widely varying geographical and climatic conditions varying all the way from the salt air of the sea coast, rain, burning desert sun, to frost and sleet, is indicative of the durability of lead pigments.

Moving 25,000 Yards in 286 Hours

H. W. McKINLEY, a subcontractor on excavation for C. G. Willis & Sons, Inc., Los Angeles, Calif., worked four 6-hour shifts a day on the Roosevelt Highway from Santa Ynez Canyon to Santa Monica Canyon near Santa Monica, Calif. He handled a heavy mixture of decomposed rock, "buckshot," shale and dirt. A considerable portion of it had to be broken up with a rooter before the wheeled scrapers could be used. The remarkable figure of 25,000 yards of excavation was moved by this contractor in 286 operating hours, with two LeTourneau 9-yard wheeled scrapers. The average yardage per hour with an average haul of 400 feet was 87.4 cubic yards. Two Cletrac 80 tractors powered the scrapers which were mounted on pneumatic tires. A Caterpillar Sixty hauled the rooter and also carried a bulldozer for spreading the fill.

On clocked trips covering a period of one hour, with a haul of 600 feet, the two scrapers picked up full loads without previous scarifying or breaking of the soil in any way and carried and spread in periods varying between six and seven minutes for each load. Sloping was carried down with the excavation.

New A. S. T. M. Tentative Specifications

THE American Society for Testing Materials has recently issued five new tentative specifications which are listed below with the names and addresses of the members to whom criticisms should be addressed. Copies of these tentative specifications may be secured from the Society at 1315 Spruce St., Philadelphia, Pa.

Cast Iron Culvert Pipe, A 142—32 T, W. H. Rother, Secretary of Committee A-3 on Cast Iron, 1543 Fillmore Ave., Buffalo, N. Y.

Methods of Chemical Analysis of Calcium Chloride, D 345—32 T, Prevost Hubbard, Secretary of Committee D-4 on Road and Paving Materials, 801 Second Ave., New York City.

Method of Test for Comparative Hiding Power of Paints, D 344—32 T, M. Rea Paul, Secretary of Committee D-1 on Preservative Coatings for Structural Materials, 105 York St., Brooklyn, N. Y.

Specifications for Clay Sewer Pipe, C 13—32 T, E. S. Rankin, Secretary of Committee C-4 on Clay Pipe, Bureau of Sewers, City Hall, Newark, N. J.

Specifications for Structural Medium Steel, A 140—32 T, H. P. Bigler, Secretary of Committee A-1 on Steel, Rail Steel Bar Assn., 228 No. LaSalle St., Chicago, Ill.

Helping Nature Settle Fills *in* Rhode Island *and* Ohio

A Few Notes About Specific Methods Used by Highway Contractors and Engineers

By
L. F. Livingston

IN building permanent roads through swamps it does not pay to lay concrete or asphalt over any insecure foundation. Fills are necessary of course, and they settle naturally in time, but not fast enough to suit road builders who must do things quickly. That is why there is a continuing lively interest in a new technique of blasting which speeds the settling of highway fills.

A Rhode Island Job

Two noteworthy examples of fill settlement operations are found in work recently done in Rhode Island and Ohio. The New England project is in connection with a construction program of the Rhode Island State Highway Department. Those directly concerned with it were: Charles Wooley, Construction Engineer, E. T. Anthony, Resident Engineer of the Highway Department, and the Callan Construction Co., of Bristol, R. I., with Joe Foley as Superintendent.

The location of the work was on Boyd's Lane cut-off on the Bristol and Fall River Highway where it was necessary to cross 1,800 feet of swamp. The boggy material encountered was muck and sand in alternate layers. The muck strata ranged from 3 to 4 feet deep and between them were sand deposits 6 to 14 inches thick. The total depth of this unstable material varied from 6 to 19 feet. Fortunately, it was a new location and was far enough away from buildings to permit open trench shooting. This procedure was decided upon because the sand lenses made under-fill shooting rather difficult.

Charges of dynamite were placed in three rows of holes. In the middle line of holes, spaced on 2-foot centers, charges from 7 to 10 pounds of dynamite were loaded in each hole. Those in the outside lines were similarly spaced but were not so heavily loaded, the charges ranging from 5 to 7 pounds per hole. In each case the explosive requirement was figured according to the depth of unstable material at that point.

The relief method of ditch blasting was resorted to in setting off the shots; that is, the charges in the outside rows were exploded before those in the center row got under way. The effect of the relief shots was to remove completely from 5 to 8 feet of material, and

A SWAMP BLAST ON THE BRISTOL, R. I.-FALL RIVER, MASS. HIGHWAY

1. *Preparing for the blast. Note the three rows of pipes marking the location of charges loaded in the holes.*
2. *After the blast. Water now covered the entire area and solid material was placed on a more substantial foundation by the end-dumping method.*

the portion which fell back into the trench was of such a consistency that the sand dropped to the bottom, leaving a very mucky "soup" above it.

The fill, which will eventually be 54 feet wide, is being carried through this trench with a 36-foot top. The dumping of solid material in the trench displaces the soft, soupy muck and forces it ahead, and further blasting in front of fill serves to blow this muck away.

In this connection the Resident Engineer developed a clever method of loading the charges. Using slender poles about 12 feet long, the cartridges of ditching dynamite were tied to the end and then pushed down into the muck at an angle parallel to the face of the fill. The men who did this work facetiously referred to these loaded poles as "Anthony's torpedoes", but that is no reflection on their usefulness for the purpose. After the "torpedoes" were in position, with the charges about 3 feet apart, the shot was fired by the propagation method.

By this means the fill was carried forward with the point ahead to force as much material to the side as possible. This work was steadily advanced until winter came and operations were suspended. Thus far the fill has been extended about 800 feet and is very satisfactory. When this 36-foot fill is completed across the swamp, ditches will be blasted on each side of the embankment and more solid material will be dumped in the excavation to extend the fill laterally until the top width is 54 feet as required. The work thus far has been so organized and conducted that the contractor, who is making the fill by the end-dumping method, has not been delayed by the blasting operations.

A WET JOB IN OHIO

The project in Ohio was carried through under the direction of the State Highway Department with Elmer Hilty, Construction Engineer and Carl Wahl, Resident Engineer. W. L. Johnson & Co., of Hicksville, Ohio, was the contractor with Fred Rowe, Superintendent, in charge.

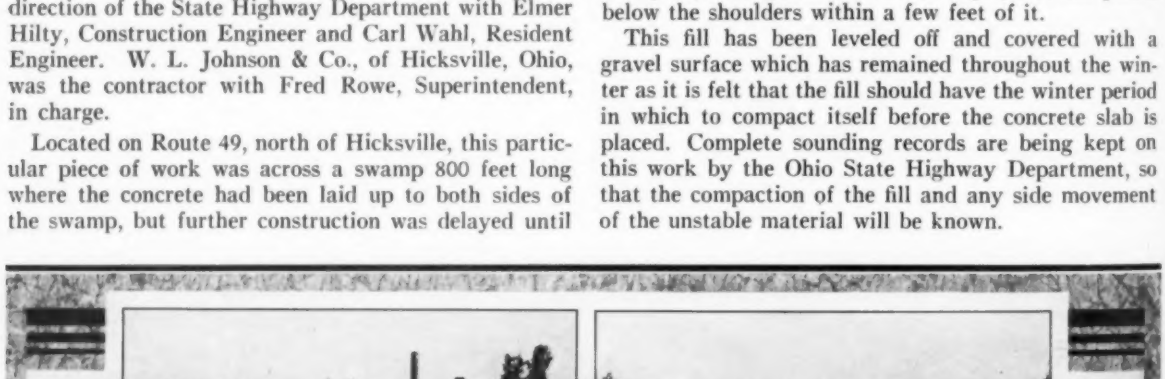
Located on Route 49, north of Hicksville, this particular piece of work was across a swamp 800 feet long where the concrete had been laid up to both sides of the swamp, but further construction was delayed until they were sure that the fill had settled sufficiently. In this case, the unstable material was from 6 to 22 feet deep and consisted of a mixture of peat, muck and soft "marly" blue clay, with a hard bottom of stiff blue clay below it. There was an old road-bed on the new alignment, so it was decided to use a combination of the "under-fill" and "relief" methods of shooting. Ten feet of super-fill was placed above the level of the required grade. Then three lines of holes were made, along the top of the fill, the center line holes on 10-foot centers, the two outside lines on 20-foot centers.

The top of this fill was 28 feet wide and the outside lines of holes were placed very close to the shoulder. The holes were made by using pieces of second-hand pipe, 4 inches in diameter, and driving them through to hard bottom. The pipes were kept free from mud during the operation by means of wooden plugs fitted to the ends and sharpened to a point to facilitate driving them into the ground. The center-line holes were loaded with charges varying from 35 to 60 pounds of 40 per cent quarry gelatin dynamite in 3 x 10-inch cartridges. In the outside holes loads ranging from 20 to 35 pounds of the same kind of dynamite were used.

After these loads were placed, ditches were blasted at the toe of each slope, using 5 pounds of du Pont ditching dynamite in holes spaced 5 feet apart along the toe. Shooting side ditches, in this instance, seemed desirable because extremely dry weather had caused the first 3 feet of the adjacent meadow to be very stiff and it was essential to make it easy for the under-fill shots to push the soft material to one side.

As soon as possible after shooting these ditches, the under-fill holes were connected up and shot electrically. The results are reported to have been very satisfactory, for the center of the fill settled to the hard bottom, or nearly so, throughout the entire length, and the points below the shoulders within a few feet of it.

This fill has been leveled off and covered with a gravel surface which has remained throughout the winter as it is felt that the fill should have the winter period in which to compact itself before the concrete slab is placed. Complete sounding records are being kept on this work by the Ohio State Highway Department, so that the compaction of the fill and any side movement of the unstable material will be known.



SETTLING A 9-FOOT EMBANKMENT ACROSS 800 FEET OF SWAMP IN OHIO

1. *Before the shot was fired under fill. Charges of gelatin dynamite were loaded under the pipes shown at the sides.*
2. *After the blast. The shot displaced the unstable material so that the central portion of the embankment dropped down to the clay bottom.*

A Contributor to *No. 4*

Construction Progress

THE beginning of 1933 would have marked the twenty-third anniversary of C. M. Babcock's connection with the Minnesota Highway Department. His first appointment as a member of the State Highway Commission, then a board of three members, was dated January 5, 1910. Mr. Babcock continued as a member of the commission until April 7, 1917, when the three-man commission was abolished and the office of Highway Commissioner created, and was head of the department since the position of Commissioner of Highways was created until December, 1932, when he resigned.

Mr. Babcock's interest in good roads, however, goes back further than twenty years. Shortly after he had entered the mercantile business in Elk River in the early nineties, he began to make a study of the connection between good roads and the stability of business. He was an active advocate of better roads in Sherburne County, pointing out to farmers and business men alike that improved roads would benefit all of them by permitting the moving of farm products and merchandise in a more even and orderly manner, without interruption, as well as increasing the business flowing into the towns which had good roads leading into the surrounding territory.

The State Highway Commission had been created in 1906, under a law passed in 1905. The act creating the commission also provided for the levy of a state-wide tax of 1/20 of a mill as state road aid. This produced approximately $46,000, which was all the commission had to spend for the encouragement and promotion of better roads. The state aid tax levy was increased to ¼ mill in 1907, which gave the commission $250,000 a year to use as state aid. With these limited funds, no great amount of road building could be done, but the state aid was used largely in building demonstration roads in the various counties, and much of the work was of an educational nature.

All the members of the Highway Commission, including the original three, were men with wide business interests, and not always able to attend the meetings of the commission, or able to devote much time to the highway program. Mr. Babcock, however, attended all meetings regularly and also devoted a large amount of additional time to the work, studying highway programs in other states, highway progress and traffic conditions in his own state, and inspecting work at numerous places. It is related that he used to sit Sunday afternoons along the river road near Elk River, now Trunk Highway Number 3, take the numbers of passing cars, and look up the home address of the owner. With this data he soon came to the conclusion, even in those early days when there were only some 25,000 cars in the state, that traffic was no longer local but state-wide in character, and he expressed the belief that car owners should contribute to a state fund for use in the development of a state system of highways.

A bill was introduced in the 1917 session of the legislature providing for one highway commissioner to devote all his time to the position, and abolishing the board of three non-salaried members. The bill became law and Mr. Babcock was appointed and, soon after taking office, he began formulation of

C. M. Babcock

the trunk highway plan by which the state was to take over a system of main routes, to be constructed and forever maintained solely by the state and paid for by motor vehicle taxes and federal aid. This plan, with some modifications, was put into effect in 1921.

To prevent neglect of the main highways during the interim between the time the trunk highway plan was proposed and the time it was voted on, the legislature passed a bill permitting the counties to issue bonds for road improvements, to be taken over by the state if the plan was adopted. A large amount of work was done under this bond issue plan and $34,000,000 of reimbursement bonds taken over by the state.

Including the work done with reimbursement bonds, however, there were only 2,589 miles of graded roads in the 7,000 miles taken into the state system in 1921. There were 183 miles paved and 2,776 miles graveled. Very little of either the grading or graveling was up to present-day standards. Mr. Babcock's first task was to build up a maintenance organization, select temporary routes, and connect, mark and gravel these routes so as to make them reasonably passable as much of the time as possible, doing heavier construction from time to time as funds permitted.

Mr. Babcock has always taken an active interest in national road matters and from time to time has taken a leading part in advocating federal road aid appropriations. He has served as president of both of the two leading highway organizations in America, the American Road Builders Association and the American Association of State Highway Officials.

Mr. Babcock said before leaving, in discussing highway changes during the twenty-three years he has been connected with the State Highway Department:

"One of the strongest features of the Minnesota trunk highway plan, and one in which I took more personal pride than anything else, was the fact that it left the state aid fund as well as all county and town road funds intact for use on secondary roads. Relieved of the upkeep of the main routes, the counties have made greater progress in road building in the last 10 years than in the whole previous history of the state."

Right Turn—Leaving One Cut to Move to the Next During the Noon Hour

Highway Grading in the Kentucky Mountains

IN western Kentucky near the great coal fields and not far from Mammoth Cave, the State Highway Department projected the relocation of U. S. Route 62 for a distance of 14.4 miles through rather rough country. The contract which required the handling of 229,861 cubic yards of earth and rock excavation was awarded to Young & Lyons of Rogersville, Tenn. This contracting organization includes two principals, one of whom is an expert in grading and dirt moving and the other a top-notch man in the drainage and bridge field. Thus a contract that is in rough country and involves many drainage structures, both large and small, is just what these folks are looking for.

The dirt moving outfit on the Greenville job consisted of two Linn tractors, a Byers Master 1¼-yard gas shovel, two Hug trucks, a Galion grader, a Cletrac 40, an I-R air compressor with two S-49 jackhammers, a 3-up scraper, a plow and a scarifier. The cuts and fills on this job were well-balanced so that the cuts were divided quite close to the top of the grade for the fills on either side. The cuts ran in depth from 0 feet to 22 feet and in length from 0 to 800 feet. The maximum yardage handled in any one cut to the two sides for fill was 16,000 yards.

Where the going was good and the hauls ran over 500 feet, the two trucks were used but on the shorter hauls and where the going was bad, the Linn tractors proved the value of their crawler treads. The outfit handled an average of 850 cubic yards of material per 11-hour day, loading to the rear of the shovel. The average haul was about 400 feet and the maximum 1,000 feet.

For the contractor the work was in charge of B. G. Young with J. H. Hood as Superintendent.

The Field for Low-Cost Road Construction

A STUDY of the paper presented by Thomas H. MacDonald, Chief, U. S. Bureau of Public Roads, at the Tenth Annual Asphalt Paving Conference develops some very interesting facts regarding the field available for the construction of low-cost roads. Starting with a recent traffic survey in Michigan, Mr. MacDonald shows:

1. That the existing state highway system of Michigan of 7,691 miles, exclusive of sections within city limits, serves an average daily traffic of 1,144 vehicles.

2. That the existing county roads totaling 17,175 miles serve an average daily traffic of 190 vehicles, and

3. That the existing township roads which make up the balance of 60,214 miles serve an average of only 22 vehicles daily.

Following these facts which have been found to be reasonably representative, and based on a careful survey of other states in which a similar division has been worked out, the indicated general classification of all existing public roads might be as follows:

	Miles	*Per Cent*
A. Federal and state highway systems to include all routes where traffic is heavy and where terminal-to-terminal traffic predominates	330,000	11
B. County highways including all important farm-to-market roads where through traffic is lighter and where highway service to adjacent property or to roads of the third class is more than the through traffic	600,000	20
C. Local roads comprising all other roads and those whose use is closely related to crop production and disposal. These are, in general, short roads, tributary to Classes A and B	2,070,000	69
Total	3,000,000	100

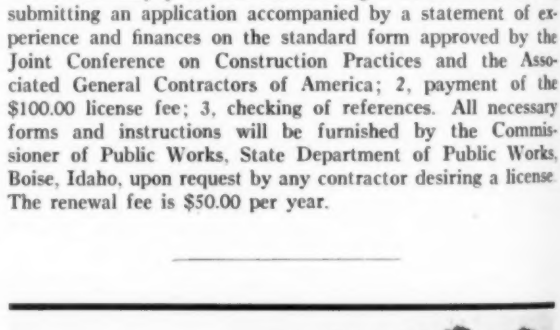
Mr. MacDonald states, "The above classification for first and second class roads, 930,000 miles, a figure that seems almost fantastic perhaps, yet according to our best estimates we have now a grand total of 720,000 miles of surfaced roads, leaving a difference of 210,000 miles yet to be improved with surface if the reported improvements were all on the roads that would fall in classes A and B. This would be by no means an impossible task within a reasonable period in the future. . ."

Thus today we have before us a possible public works program involving the improvement of 210,000 miles of important highways through surfacing, a type of work which can be done economically by contract and through the employment of a large number of unskilled laborers in all part of the United States.

Idaho Passes Contractors' License Law

THE last session of the Idaho Legislature passed a Contractors' License Law making it necessary for all contractors desiring to bid on any public work within the state to be licensed by the Commissioner of Public Works. Particular attention is directed to the necessity of securing a license at least thirty days before bids may be submitted.

The necessary procedure for securing a license includes: 1, submitting an application accompanied by a statement of experience and finances on the standard form approved by the Joint Conference on Construction Practices and the Associated General Contractors of America; 2, payment of the $100.00 license fee; 3, checking of references. All necessary forms and instructions will be furnished by the Commissioner of Public Works, State Department of Public Works, Boise, Idaho, upon request by any contractor desiring a license. The renewal fee is $50.00 per year.



Caterpillar Diesel Tractors at Work on the Jones & Rodgers Levee Job at Talullah, La. One Tractor is Pulling the Elevating Grader While Another Is Hauling Two Large Crawler Wagons Loaded with Buckshot.

The Editor Comments

On with the Public Works Program

The Public Works Bill has finally been passed by the Senate after dallying around the Halls of Congress with the politicians trying to make up their minds how they are going to finance the $3,300,000,000 program that will be the last big boost which will put the citizens of the United States on their collective feet again. It makes little or no difference in the long run just how it is financed. The important thing is that the Public Works Program will be the elixir of the age in rejuvenating the country.

Of the billions in the Program there is the sum of $400,000,000 allotted for the construction of highways under the direction of the U. S. Bureau of Public Roads which has been such a fine institution for the improvement of the highway departments of the states. It is too bad that the official act cannot give the Bureau more power to prevent political overturns in the highway departments. Of the $400,000,000 that is to be used for highway construction $300,000,000 is to be allotted on the regular basis of mileage of highways approved by the Bureau of Public Roads and the sum of $100,000,000 to be allotted on a population basis. For example, Alabama receives $6,369,900 regular and $2,200,000 on the population basis; Massachusetts receives $4,280,460 regular and $3,500,000 on population; Minnesota receives $8,437,470 regular and $2,100,000 on population; Texas receives $19,080,300 regular and $4,700,000 on population; and California receives $11,655,870 regular and $4,600,000 based on her population. Think what this means in the light of our present knowledge of the construction of highways. We have been hard pressed for several years to get the funds for the construction of the highways which we know should be built to take care of the traffic that is bound to come as soon as the business of the country returns to something to which we can refer as normal. We have found that there are cheaper ways of building concrete roads by trying new ways of building the old Hassam pavement, we have found that we can build bituminous macadam that is the equal of any other type of highway and will not need the expensive maintenance that characterized the older types. Gentlemen, the era of the best in construction, to secure the most of the best for the money at hand, has arrived.

Then there are the manifold other construction activities that are to be effected by this measure, water works construction, sewage treatment plants, extensions of water mains and sewers, grade crossing elimination that has lagged because so large a part of the burden was put on the railroads. Secretary Perkins of the Department of Labor has suggested low cost housing developments which will provide employment for large numbers of artisans in the creation of new and finer dwellings in place of the old slums. The passage of the HR Bill 5664 and S. Bill 1712 will put back the American laborer into circulation and with him the American dollar will become again the article of trade which did business thirty times a year and brought comfort, pleasure and happiness to the American laborer and worker and executive. ON WITH THE PUBLIC WORKS PROGRAM!

Maintenance Work Now Under Contract in Arkansas

On April 29 the Arkansas Highway Commission received bids for two maintenance jobs, one involving the furnishing and hauling of 68,000 cubic yards of surfacing material, and the other for repairing 39 miles of bituminous surfacing. It is reported that the highway funds of the state of Arkansas are very low, hence all highway expenditures must be made with the greatest regard for economy. The reason for letting maintenance work by contract instead of doing the work with the state's own maintenance forces was undoubtedly to make the money go as far as possible.

There Is a Santa Claus

Perhaps we are approaching an era of appreciation of the contractor. At least some of us can catch a gleam of hope from a story which I heard from an authentic source a few weeks ago. Here it is. A general contractor in one of our eastern cities recently completed a large building project. Yes, large—particularly large for these times. The contract was signed on a cost plus a fixed fee basis. After the dedication of the structure when the final estimates had been paid, the owner called the general contractor into his office and thanked him for the character of the work performed, the speed with which it had been executed and the fine relationship which had existed between owner, architect and contractor. Thereupon he handed the general contractor a check in six figures, stating that it was in the nature of a personal appreciation of the work of the contractor. Our congratulations to the contractor for winning this award and congratulations to the owner for appreciating fine workmanship!

Theodore Reed Kendall

How the Other Fellow Did It

Ideas That Have Already Proved Helpful to Contractors

Seven Bags All in a Row

233. A contractor with a fertile mind for labor-saving schemes has developed a method whereby the seven bags of cement for his batch of concrete land in the paver skip right side up ready to be counted and dumped. Here is the way he does it. At the cement shed the batch trucks receive the seven bags of cement before the aggregates are placed in the compartments. In order to eliminate any danger that the cement bags might get damp from the sand, a canvas flap is hung on the batch gate in the truck. The cement bags are placed upside down in the compartment and the canvas flap dropped over them. Then the sand for the batch is dropped on the canvas from the batcher, followed by the stone. At the skip, almost like magic, when the dumper trips the batch, out shoots the stone, then the sand, and last, right side up, the seven bags of cement all ready to be cut and emptied.

24.2.20

A Cantilever for the Center Joint Man

234. On midwest operations where markers are placed in the longitudinal center joint, they are usually placed within the limits of the center joint machine which is either self-powered, operated by a hand ratchet, or pulled by the finishing machine. On a Minnesota job a four-wheel trailer was pulled by the finishing machine and carried a plow cutter to make the slot for the continuous center dummy joint. On the trailer there was also a hand cutter for the dummy contraction joint. This cutter consisted of a heavy plank on edge cut to the crown of the pavement and equipped with plow handles. A blade fastened to the lower edge of the plank cut the dummy joint for the insertion of the markers. This was done by the men who handled the longitudinal float. On the front of the bridge was a cantilevered plank on which one of the men stood to place the removable center dummy joint marker. This position left him free to work out over the slab without interference.

24.3.34

Multiple Batches

235. There is no doubt that a great deal of time is lost on paving jobs where industrial railway equipment is used to haul the batches, when a single batcher is used for loading the batch boxes. An Illinois contractor whose work we studied with a great deal of interest built a long wooden bin with four batchers for stone and four for sand. These were so grouped that with an 8-car train three stops were all that were necessary to complete the loading of the weighed batches of aggregate. An Iowa contractor put somewhat the same idea into use at his cement dock when he had a 10-car industrial railway train carrying twenty batch boxes. The cement dock was 84 feet long and 12 feet wide with a 2-foot extension for the dumping traps and then a further 4-foot extension to form the top of the tunnel through which the industrial train ran. He lined up two sets of ten cement carts on the cement dock, which was so constructed that the train ran underneath as through a tunnel. One set of ten carts was dumped into the batch boxes and then the train moved ahead to the other set of ten traps and the remaining batch boxes were filled. The time between trains was ample to permit six men working on this dock to load the twenty cement carts and have them ready at the trap for dumping. Two freight cars were worked at one time with three men to each car loading and weighing individually.

24.3.25

A Broom for the Cement Scales

236. In the large number of bulk cement jobs we have visited where small platform-type beam scales have been used for weighing the cement carts and cement, there have only been one or two instances where we have noted a broom kept handy to the scales for brushing off any cement spilled on them when shoveling cement to or from the carts to bring them to the correct weight. It was not unusual to spill a quarter or half pound of cement from a shovel, and if this happens to land on the platform it makes just that much error in the weight of each succeeding batch. One Minnesota contractor insists that a broom be kept handy near the scales so that the men weighing and dumping can sweep the scales and trap frequently. Not a bad idea; keep it in mind.

24.3.34

Preventing Petty Thievery

237. An Iowa contractor who kept his forms fully 2,000 feet ahead of the paver on a 14.5-mile job realized that, with the job strung out over such a distance, one watchman would not be able to prevent petty thievery. He, therefore, built a tool house on an old wagon which was used to carry all of the fine grade tools such as shovels, stakes for the forms, carpenter's levels and other small tools. Every tool was placed in the house at night and was locked up; thus what many contractors consider as "minor losses" were reduced to a minimum. Many contractors now are also branding the wooden handles of tools and even tires with small hand portable outfits, to identify them definitely in case they are removed from the job.

24.3.26

An Extra Long Boom for the Paver

238. Eastern contractors operating in states where concrete pavements are laid in 10-foot strips are resorting to ingenious methods for pouring the strips, particularly where four or more lanes are to be laid. One New Jersey contractor has his 27-E paver equipped with a 24-foot boom so that it is possible for the paver to run along the grade, reach over a 10-foot slab which has already been poured but not opened to traffic and pour a strip beyond. This means considerable saving in routing the operations, as much time is saved in moving to a new location and back again when the adjacent slab has been opened to traffic.

24.2.19

Hand Tamping of Road Forms

239. Too much reliance cannot be placed on the form setters and the methods used for cutting the form trenches for steel road forms for concrete pavements in order to secure a firm foundation for the forms. It is infrequently that we see hand tamping of these forms. At least one man should be engaged in this work. We have noted that contractors who boast of the least number of irregularities in their pavement usually insist on hand tamping. The forms are not inflexible and if there is any point in the base which is not supported, the form will tend to flex at that point with a consequent slight depression in the riding surface of the slab. This depression is somewhat overcome by the use of the longitudinal float, but the practice of tamping the base of the forms is one worth following on all concrete work. On one particular Minnesota job we noted that one man spent all of his time hand tamping the forms, assisted by a second man who put in part of his time oiling them.

24.3.34

Construction Industry News

Portland Cement Association, 33 W. Grand Ave., Chicago, Ill., has announced that A. J. Boase has been appointed Manager of the Structural and Technical Bureau in Chicago, succeeding W. E. Hart who has been in charge of the Bureau for a number of years, but who will now devote his entire attention to the development of architectural uses of concrete. O. E. McMullen, formerly professor of Civil Engineering at Drexel Institute, has been appointed regional structural engineer at Philadelphia; M. J. McMillan, formerly regional structural engineer at Chicago, has been transferred to a similar position in the Washington office and J. R. Goetz has succeeded Mr. McMillan in the Chicago office. B. E. Brevik, formerly in the Milwaukee office, has been reassigned to that office to look after structural and farm work.

Bucyrus-Erie Co., So. Milwaukee, Wis., has announced the acquisition of the drill business of the Armstrong Manufacturing Co., Waterloo, Iowa. George R. Watson, formerly President of Armstrong Manufacturing Co., has become associated with the Bucyrus-Erie Co., and will be in charge of the drill business. Armstrong drills and bit sharpeners will be manufactured and sold by Bucyrus-Erie, this change to be effective immediately.

Iowa Manufacturing Co., Cedar Rapids, Iowa, manufacturer of Cedar Rapids crushers and material handling equipment, has announced the appointment of the following distributors: J. C. Corrigan Co., 179 Lincoln St., Boston, Mass., for Massachusetts and Rhode Island; J. Shuman Hower, 106 Foster Bldg., Utica, N. Y., for central New York; Charles S. Porter Supply Co., 424 Fourth Ave., Huntington, West Va., for the state of West Virginia; Interstate Machinery Co., Omaha, Nebr., for all of Nebraska; Bublitz Machinery Co., 2139 Washington St., Kansas City, Mo., for western Missouri and Kansas; Henry D. Petter Supply Co., Paducah, Ky., for western Kentucky; Carolina Contractors Equipment & Supply Co., 824 Lady St., Columbus, S. C., for the state of South Carolina; and Contractors Service, Inc., 317 W. Worthington Ave., Charlotte, N. C., for all of North Carolina.

The Brown-Bevis Co., 4900 Santa Fe Ave., Los Angeles, Calif., distributor of construction equipment which has been in receivership for nearly two years, has been sold to a new organization consisting of Walter Parsons, formerly General Manager of that company; J. A. Beynon, formerly Secretary and Treasurer of the Kimball Krogh Pump Co., Los Angeles; C. M. Weinberg, President of the California Equipment Co., Los Angeles and B. G. Rhodes. The Brown-Bevis Co. has been prominent in the machinery business of southern California for many years and business will be continued without interruption at the present location.

Republic Steel Corp., Youngstown, Ohio, has announced the removal of its Buffalo District Sales Office to 475 Abbott Road, Buffalo, New York. Thomas B. Davies, District Sales Manager, and his present staff will continue in charge at the new location.

Boehck Equipment Co., Milwaukee, Wis., has announced that A. H. Jensen and A. S. Ott, formerly with the Hunter Machinery Co., are now affiliated with its sales force. Mr. Jensen will cover the southern part of Wisconsin as well as a large part of Milwaukee and Mr. Ott will cover the northern part of the state and a portion of Milwaukee County.

The Gorman-Rupp Co., of Mansfield, Ohio, was organized in March, 1933, for the manufacture of self-priming centrifugal pumps, which are supplied for belt drive or furnished as complete units powered with either electric motors or gasoline engines. The officers of the company are J. C. Gorman, President and Treasurer, who was associated with the Barnes Mfg. Co. for seventeen years and H. E. Rupp, Vice-President and Secretary. H. E. Rupp is also Engineer in charge of design and production. Distributors for Gorman-Rupp pumps are now being appointed.

Syracuse Road Machinery Co., Syracuse, N. Y., has taken over the manufacture and sale of the G. S. C. Hi-Speed spreader for gravel, sand, crushed stone and calcium chloride. Production has already begun on the new units, into which have been incorporated a number of improvements.

Chain Belt Co., Milwaukee, Wis., has announced the appointment of Superior United Corp., Chicago, as its distributor for the complete line of Rex construction equipment in the district of Chicago and the state of Indiana.

Never Transport Explosives and Detonators Together

THE danger of transporting explosives and detonators in the same vehicle has been pointed out repeatedly by explosive manufacturers. Probably no rule in the handling, transportation, and use of explosives has been emphasized so strongly.

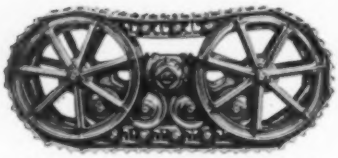
If it requires a tragic accident to drive home the significance and necessity of such precaution to some users, we can cite a recent case where, although the quantities were small, a man was killed.

A truck driven by its owner was hauling some gravel, and also 25 pounds of dynamite and 100 No. 6 blasting caps. The cause of the accident is unknown, but it is believed that the dynamite and caps were being carried on the seat beside the driver and that they slipped to the floor. The dynamite evidently fell on the caps, causing an explosion that instantly killed the driver and completely wrecked the truck.

Every person who has anything to do with the handling or transportation of dynamite should be thoroughly familiar with this important rule: "Don't transport explosives and detonators in the same vehicle."

—From *The Explosives Engineer.*

Extremely Rugged Country Was Encountered in Grading the New Section of the Generals Highway, Sequoia National Park. Note the Protection of the Tree During Blasting.



The New A-C Steel Wagon Track

A New Track for Crawler Wagons

A 15-TON drop-forged steel wagon track which is built and designed exactly like the track assembly of its Model L tractor has been announced by the Allis-Chalmers Mfg. Co., Milwaukee, Wis. The features of this track are that the load-carrying track wheels roll on the rail of an endless track and the idlers or end wheels which carry no weight merely pick up the track in the rear and deposit it in the correct position at the front.

The side bars are drop-forged and heat-treated. The track pins and bushings are of carburized and hardened steel, and the shoes are of a special rolled section of a flat type, reinforced to distribute the strength uniformly over the entire surface. The track and end wheels are mounted on anti-friction bearings. This new track has a net loading capacity of 15 to 20 tons, and has overall dimensions of 20 inches in length, 36 inches in height, 19½ inches in width and the track shoes, 18 inches wide. The tracks weigh 5,252 pounds per pair.

A New Four-Drum Power Control for Wheeled Scrapers

HANDLING two cable-controlled 11-yard wheeled scrapers behind a single tractor, with both scrapers operated by the tractor operator, is made possible by a new four-drum power control just placed on the market by R. G. LeTourneau, Inc., Wilson Way at Roosevelt, Stockton, Calif. The new unit has been some months in development and virtually doubles the amount of dirt a tractor-scraper set-up can handle on a single trip, with the same labor cost and at approximately the same consumption of fuel as when a single scraper is hauled. The combination turns in a radius of only 30 feet.

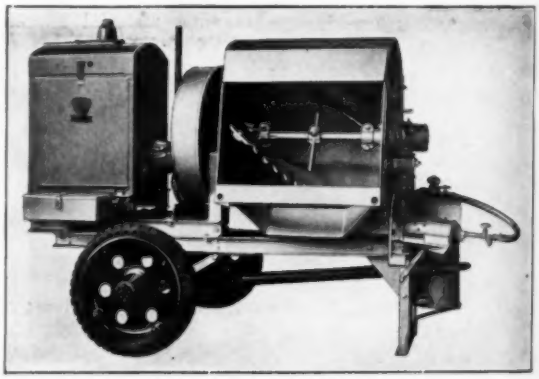
The control unit is handled by means of levers. One lever controls each drum; thrown into one position it engages a clutch and causes the drum to wind up the cable, thrown into the opposite position, it releases the drum and allows the cable to run out; when the lever is released an automatic brake locks the drum into position. Two drums are used for each scraper; one to lower the scraper bowl for loading and raise it for hauling, the other to operate the unloading gate.

This Combination of Tractor, Two LeTourneau Carry-All Scrapers and LeTourneau Four-Drum Power Control Unit Moved Dirt at an Average Rate of 22 Cubic Yards Hauled 800 Feet in 4 Minutes

On a test operation, one Caterpillar Seventy diesel tractor equipped with the new four-drum control unit and two LeTourneau 11-yard scrapers on pneumatic tires leveled a 40-acre tract, with contour differences of as much as 13 feet 6 inches, in 220 working hours. Trips 2,500 feet in length, with each scraper loaded and dumped three times per trip, were made in an average of 12 minutes, or 22 yards of dirt moved approximately 800 feet in 4 minutes.

Internal Vibration for Compacting Dry Concrete

A TOOL for the internal application of vibration for compacting dry concrete has been developed by Munsell Concrete Vibrators, 269 Cherry Lane, Teaneck, N. J. This Munsell vibrating blade has been designed to reach those hidden places that cannot be consolidated by vibrating the forms or the reinforcing. The blade consists of a half oval steel bar ½ x 2 inches in section by 3 to 15 feet long which is rigidly attached to the vibrator body. In operation the blade is placed in the concrete as deposited in the forms and the vibration permits the escape of the entrained air and water as the concrete is compacted. As the blade can be operated close to the forms, it eliminates the collection of air and water bubbles on the forms, resulting in the elimination of honeycomb. This blade is particularly recommended for construction work in columns, thin walls, deep girders and beams and in concrete products such as cast concrete pipe, concrete piling and ornamental work.



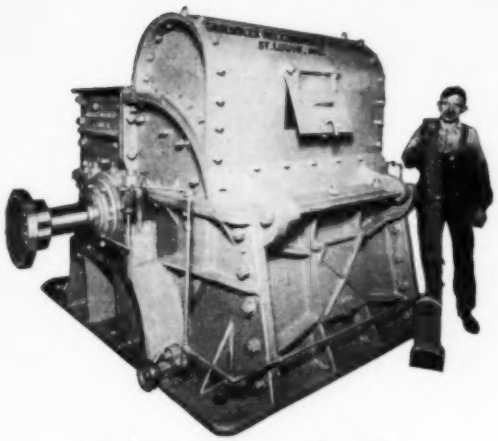
The New Kwik-Mix Bituminous Mixer

A New Bituminous Mixer

A NEW bituminous mixer built in two sizes, 6 to 8 cubic feet and 10 to 12 cubic feet, has been announced by Kwik-Mix Division, National Equipment Corp., No. 30th St. & W. Concordia Ave., Milwaukee, Wis. This mixer has specially designed adjustable manganese saw-tooth blades with a criss-cross mixing action to accomplish a thorough and speedy coating of the material with a minimum of bitumen. A detachable heater is conveniently located at the end of the machine away from the engine, for safety and efficiency.

The indirect application of heat by means of a shell around the drum gives even heat; therefore the material is not burned, neither does it become "balled."

Special features of the mixer bring about easy operation and thorough, efficient mixing of evenly coated material. These machines permit economical placing of cold or hot patch material on location for bituminous roads. They are also used for centralized plant operation, or for many other surfacing projects.



A Heavy-Duty Hammermill Crusher

Hammermill Crushers

CRUSHERS built on the hammermill principle of reduction, which permits the material to be reduced in one operation to practically any degree of fineness desired, are made by the Gruendler Crusher & Pulverizer Co., 2915-2917 No. Market St., St. Louis, Mo. The heavy-duty hammermill is adjustable to any size fineness desired from as coarse as 8 inches to as fine as 100 mesh. It is manufactured in sizes to give any capacity from 3 tons per day to as much as 600 tons per hour. This pulverizer can be used as a preliminary, secondary or a finishing crusher or pulverizer. The grate bars are interchangeable to any opening from 1/16 to 10 inches. The hammers are also adjustable toward the breaker plate for taking up wear by step-out holes conveniently arranged on discs. The breaker plates are reversible, end for end, and depending upon the type of machine are also adjustable toward the hammers for taking up wear by means of a take-up wedge and backing plate or by heavy stay rods.

The top half of Gruendler crushers is designed so that one quarter of the top is hinged and can be swung open to give access to all internal parts without disturbing the hopper or any feed arrangement. The crushers are equipped with either heavy ring oiling or with locomotive-type roller bearings. The angle of the intake hopper is arranged to give the greatest impact and ease of crushing with the least use of power.

A Power-Controlled Elevating Grader

A NEW power-controlled elevating grader which has an arched A-frame, giving ample clearance for the carrier and permitting a higher lift for loading large wagons, has been announced by the Caterpillar Tractor Co., Peoria, Ill. Three-point suspension of the grader frame protects it from twisting strains, and a swivel king bolt allows full oscillation of the front wheels and very short turns. Drum-type wheels which cannot clog are a feature and both front and rear axles are extended to balance the weight of the carrier.

Full power control is provided through a gear box similar to those used on Caterpillar auto patrols. Four power levers control adjustments of the carrier and plow and all operating controls, including the clutch, throttle and gong, are grouped within easy reach of the operator's seat directly over the plow.

A 46-horsepower Caterpillar engine, mounted on a subframe at the left side of the rear axle, furnishes power to operate the carrier, power controls and automatic pan carrier. This mounting of the engine balances the weight of the carrier, gives the operator an unobstructed view and removes him from the heat and exhaust of the engine. Exposed chains and gears are eliminated. The 48-inch belt is driven by enclosed gears and a universal shaft along the rear of the carrier. Power control, adjusting hoists, and the automatic pan cleaner also have enclosed gear drive.

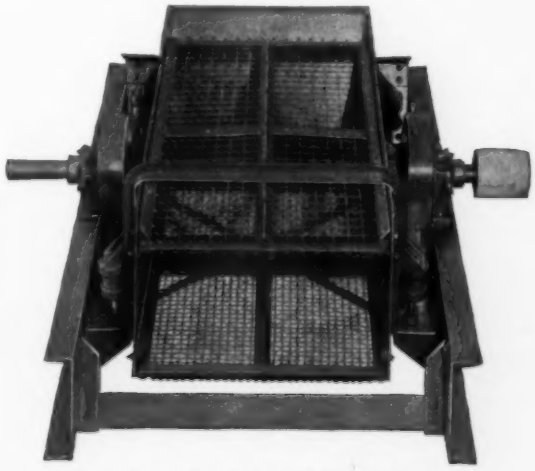
The standard 19-foot carrier may be increased to 22 or 25 feet by adding 3-foot extensions. The belt is provided with an automatic reverse check so that its load of dirt cannot roll back in front of the plow when the clutch is released. The steel carrier is built with heavy tubular spacers and strong diagonal braces. Steel built rollers, mounted on roller bearings, are spaced 12 inches apart. A "V" cleaner floats flat on the returning belt and a gear-driven pan cleaner provides positive cleaning in front of the lower drum.

The free-floating plow beam is a built-up box section weighing 675 pounds. It is suspended on chains, and this mounting protects the plow from hidden obstructions, insures a uniform furrow and permits easy and accurate adjustment of the plow.

A Positive-Drive Vibrator Screen

A NEW line of positive-drive, anti-friction bearing, vibrator screens has been announced by the Pioneer Gravel Equipment Mfg. Co., 1517 Central Ave., Minneapolis, Minn. This company has built vibrator screens for sand rejection into its portable plants for ten years and since 1927 has used positive-drive vibrators for pit-run screening of materials of No. 3 mesh size to dust. A feature of the new screen is the balance of the screen pan in itself and the fact that the eccentric shaft with the heavy steel flywheels, machined all over, also form a complete balanced assembly, after the screen pan is placed on the shaft.

Dirtproof housings of steel, labyrinth style, are used for mounting the heavy eccentric shaft running in heavy-duty self-aligning SKF bearings. The eccentric shaft has these bearings and closures both on the screen pan and the main frame, so that the vibration is created in the screen pan by means of the positive action of the eccentric shaft with a ¼-inch stroke. The wire screen frame is built to keep the wire mesh in proper tension, and it may be removed by loosening two clamping side bars. The screen pan is adjustable from 22 to 27 degrees slope. The screens are run at 1,200 rpm against the flow of material when the slope of the pan is over 22 degrees. These Pioneer vibrator screens are offered in four sizes ranging from 24 x 48 inches to 48 x 96 inches in single and double decks, except in the larger size, which is also offered with a triple deck.

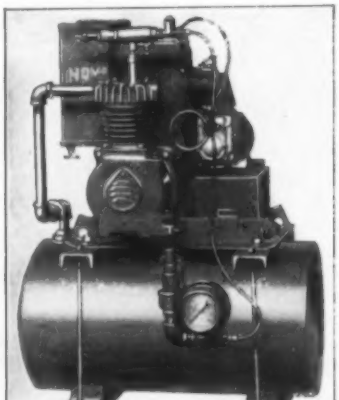


One of the New Pioneer Vibrator Screens

A Service Compressor

A NEW gasoline-engine-powered compressor which meets the needs for tire inflation and paint spray service, where electric current is not available, or for mounting on a truck to render roadside service, has been announced by the Novo Engine Co., 216 Porter St., Lansing, Mich. Contractors operating a fleet of trucks find this particularly adaptable for mounting on service trucks for tire inflation out on the job.

The Monobloc allows very small mounting dimensions. The compressor is bolted directly to the bloc of the engine and the compressor crank is mounted on the extended end of the engine crankshaft. The power unit is the Novo 2-horsepower Model AG engine equipped with impulse coupling and high tension magneto for easy starting. The crankshaft of the engine, as well as that of the compressor, is mounted on roller bearings. The complete compressor is mounted on a 12 x 28-inch air receiver with pressure gage, by-pass control and relief valve, making a compact complete unit. It is built in three sizes giving 200, 150 and 40 pounds pressure respectively with corresponding displacement of 3.6, 7.2 and 12.75 cubic feet.



The Novo Gasoline-Engine-Powered Compressor

A New Type of Dragline Bucket

A NEW and radically different form of bucket for dragline excavation, known as the Page automatic bucket, has been announced by the Page Engineering Co., Clearing Station, Chicago, Ill. According to John W. Page, President of the company, "dragline buckets in the past have given operators much trouble in that they had to be jockeyed into position before they would dig; thus, by redesigning the hood so that the bucket would immediately rock backward and land on its teeth without having to be lifted onto its teeth by a forward pull on the load line, the secret of efficient digging has been arrived at."

The automatic bucket almost completely eliminates the forward projecting sides which have characterized dragline buckets. Hence it has eliminated the need for heavy reinforcing, resulting in a lighter weight bucket with no sacrifice of strength. The entire weight of this bucket is on its teeth when its starts to dig, and it will dig as effectively in a deep pit as on the surface. The improved draft hitch, covered by patents, makes the teeth bite into the earth regardless of pit depth. The hitch plates are adjustable to suit the nature of the digging, giving quick action to the bucket in loading. Carrying and dumping of loads is accomplished in the same manner as previously, with the advantage that the high forward extending arch allows a full load to fall through without obstruction.

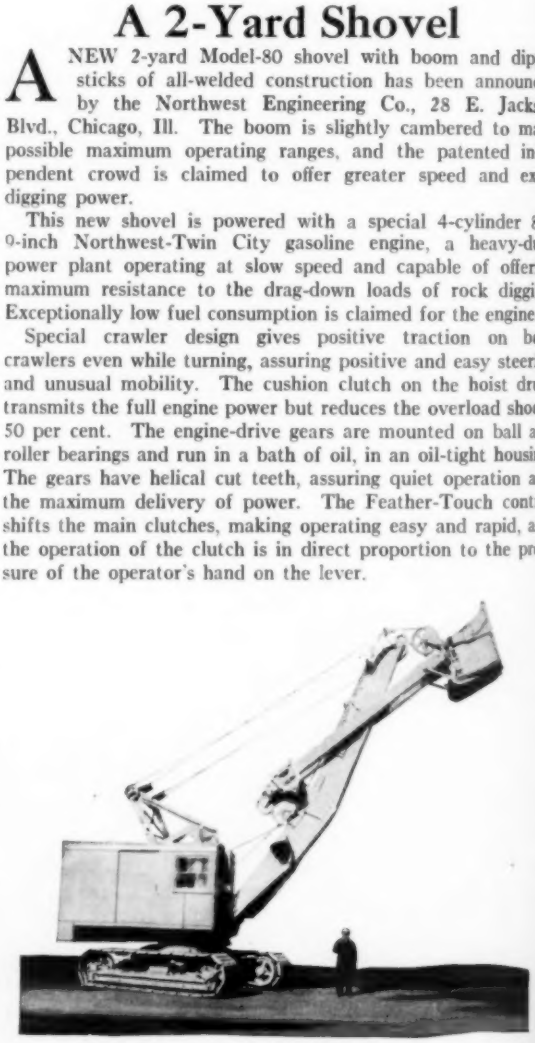
The New Page Bucket for Dragline Excavation

A 2-Yard Shovel

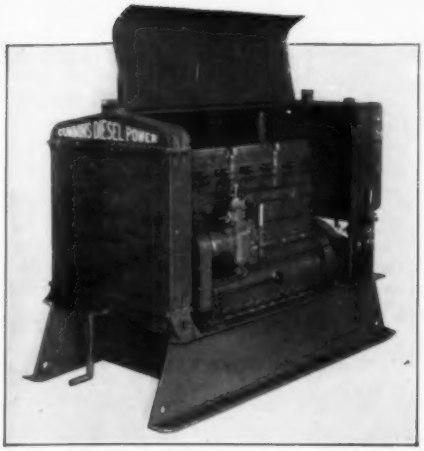
A NEW 2-yard Model-80 shovel with boom and dipper sticks of all-welded construction has been announced by the Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill. The boom is slightly cambered to make possible maximum operating ranges, and the patented independent crowd is claimed to offer greater speed and extra digging power.

This new shovel is powered with a special 4-cylinder 8 x 9-inch Northwest-Twin City gasoline engine, a heavy-duty power plant operating at slow speed and capable of offering maximum resistance to the drag-down loads of rock digging. Exceptionally low fuel consumption is claimed for the engine.

Special crawler design gives positive traction on both crawlers even while turning, assuring positive and easy steering and unusual mobility. The cushion clutch on the hoist drum transmits the full engine power but reduces the overload shocks 50 per cent. The engine-drive gears are mounted on ball and roller bearings and run in a bath of oil, in an oil-tight housing. The gears have helical cut teeth, assuring quiet operation and the maximum delivery of power. The Feather-Touch control shifts the main clutches, making operating easy and rapid, and the operation of the clutch is in direct proportion to the pressure of the operator's hand on the lever.



The Northwest 2-Yard Shovel



One of the New Cummins Automotive-Type Diesel Power Units

Diesel Power Units

AUTOMOTIVE type diesel units of both 4 and 6-cylinders have been announced by the Cummins Engine Co., Columbus, Ind. These Model HP complete power units have cylinders 4⅞-inch bore by 6-inch stroke, the displacement being 448 and 672 cubic inches for the 4 and 6-cylinder units respectively. Governed at a maximum speed of 1,200 rpm, these units are rated at 55 horsepower for the 4-cylinder and 85 horsepower for the 6-cylinder engines. The fuel system incorporates the exclusive Cummins principles of measuring, gasifying and injecting the fuel, which secures even firing, smooth operation, clean burning and economy of operation.

All units are furnished complete and portable. The equipment includes starting motor, generator, fuel oil tank of 34-gallon capacity, air cleaner, radiator, fan, starting switch and all controls in an instrument panel and power take-off with clutch including an 8-inch shaft extension.

Operating on low priced fuel oil, these units are recommended for driving generators, compressors, sand, gravel and crushed stone plants, and in an open type, without the radiator and fan for pump drive and for permanent installations.

A New Roller-Bearing Idler

A RECENT addition to the Fairfield line of idlers for belt conveying systems made by the Fairfield Engineering Co., Marion, Ohio, is the Timken roller-bearing idler 6 inches in diameter, available in both the troughing and return roller types. The troughing idlers consist of three pulleys. They are supported by malleable iron brackets and a self-cleaning angle base. The pulleys are of the demountable type with all three interchangeable, one with the other.

The return rollers are the conventional flat one-piece rollers with steel supporting brackets. Pulley construction in all instances includes three-fold labyrinth grease seals with ample grease reservoirs provided throughout. These Fairfield idlers are built for conveyor belts ranging in widths from 14 to 60 inches.

A New Hydraulic Bulldozer

A NEW hydraulic bulldozer for the McCormick-Deering T-40 TracTracTor has been announced by The Frank C. Hough Co., 919 No. Michigan Ave., Chicago, Ill. Built simply and rugged, this new bulldozer, according to the manufacturer, embodies ten years' experience in the manufacture of hydraulic dirt-moving tractor equipment. Strength is a feature of the design, the blade being ⅝-inch thick and heavily braced and reinforced, as well as being adjustable as to pitch, and equipped with a high carbon reversible cutting edge. The blade movement is from 7 inches below ground level to 14 inches above. The hydraulic pump is of the simple rotary gear type which has been in use for the past eight years.

A New 3-Wheel Gas Roller

THE new Galion Chief 3-wheel gasoline roller is built to operate at a top speed of 6 miles per hour which means less time lost in moving from place to place. It is equipped with a powerful 6-cylinder motor providing an abundance of power to meet all working conditions. The motor is spring mounted making higher speeds practical without shock to the machine or strain on the power plant. The shorter wheel base permits the roller to be turned around in less than 20 feet of space. Hydraulic steering gives quick responsive control with practically no effort on the part of the operator. Only a slight movement of the steering wheel instantly adjusts the front roll to its full turning radius. The Galion Iron Works & Mfg. Co., Galion, Ohio, maker of this roller, is well-known for its other hydraulically operated equipment such as graders.

The roller is equipped with a differential lock which permits locking of both rear wheels together to prevent slippage. A powerful hydraulically-operated scarifier permits scarifying and rolling in one operation. A sprinkler attachment mounted just forward of the center of each roll plays a powerful stream of water on all three rolls to overcome the pulling action when rolling sticky material such as hot-mix. This roller is furnished with an electric starter, with electric lights optional.

The New Galion Roller Called "The Chief"

Insley-Hercules Wheel Scoops Drawn by a Caterpillar Tractor

Wheel Scoops for Grading

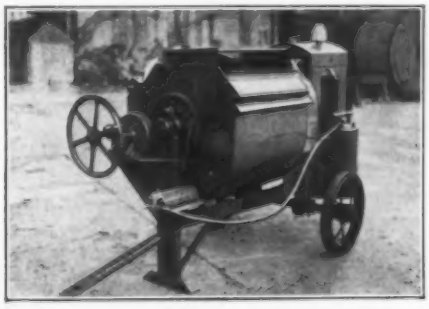
A WHEEL scoop which digs automatically by power, lifts and carries the dirt, dumps it and spreads it accurately has been announced by the Insley Mfg. Co., Indianapolis, Ind. Insley-Hercules scoops are made in 1 and 2-yard sizes and are normally operated in trains of three or four, depending upon the power of the tractor and the working conditions.

The scoop itself consists of a bowl with rounded edges, suspended on springs connected by means of a pair of bars to an axle passing through the hub of the wheels. Incorporated as a part of the axle is an internal expanding band clutch completely enclosed in a dirtproof housing. This clutch is controlled by the operator, by means of a lever and hand line, and by means of this clutch the operator controls the depth of the cut. Engagement of the clutch turns the axle forward, lowering the scoop into digging position and lengthening the tension springs. When digging is completed, release of the clutch allows the power of the spring to lift to bowl clear of the ground into traveling position. Dumping is done by repeating the engagement of the clutch and at the same time releasing a latch on the drawbar.

The scoops are connected by means of swivel hitches on the front end of each bail. An oil cushion hitch, as a resilient, shock absorber connection between the tractor and the first scoop is available and recommended. An operator's platform with a safety rail is mounted on the first scoop.

A Mixer Built for Cold Patch

A NEW cold patch mixer of the pugmill type which will handle either emulsified or cut-back asphalt without balling up has been announced by Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis. The machine is complete with a built-in but quickly detachable heater and will work with any type of asphalt or aggregate up to 2½ inches. The Rex cold-patch mixer will mix a batch of emulsified asphalt in 20 seconds and, with its discharge mechanism, insures a full batch every time. An extra large hand wheel operating through a 7 to 1 gear reduction tilts the Rex drum into the discharging position and locks it automatically.



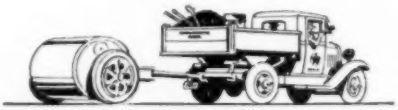
The New Rex Cold-Patch Mixer

The Rex cold-patch mixer has a capacity of 4 to 6 cubic feet of mixed material, depending upon the size, type of asphalt and aggregate used. The charging shield gives the drum ample capacity to handle 2½-inch aggregate satisfactorily. To meet the abrasive qualities of an asphalt aggregate mixture, this mixer is built with hardened liners that are renewable. The paddles are of high carbon steel with hardened steel scrapers which are adjustable to compensate for wear. It is powered with a 2-cylinder radiator-cooled 8 horsepower Le Roi engine or a 2-cylinder hopper-cooled 8 horsepower Le Roi engine equipped with high tension magneto. It is mounted on steel-spoke, rubber-tired roller-bearing wheels or steel-spoke, steel-tired wheels and is built with a trailer mounting and a telescoping towing tongue.

A New Surface Roller

A WHEELED roller which can be hauled as a trailer on its wheels and moved quickly from place to place behind any motor vehicle and which can be transformed from a trailer into a roller by simply turning over the tongue has been patented by the Wheeled Roller Corp., P. O. Box 862, San Antonio, Texas. The State Highway Department of Texas is using these rollers on bituminous work.

The roller width of the standard Wheeled Roller is 36 inches and weighs approximately 108 pounds per contact inch. It can be furnished, however, in weights up to 200 pounds per contact inch. By adding sand or gravel through openings at ends of the drums the weight of the standard Wheeled Roller may be increased to approximately 160 pounds per contact inch.



The New Wheeled Roller Attached to a Truck

The wheels of this roller are equipped with either solid or pneumatic tires, and have Timken bearings. The eccentric axle construction raises the wheels out of the way when the roller is to be used to compact a surface.

New Three-Way Crawler Dump Wagon

TO meet the increasing demand for all-purpose crawler-equipped hauling units, the Trackson Co., 1320 So. First St., Milwaukee, Wis., has announced the addition of three-way crawler dump wagons of 7 to 10½-cubic yard capacity to its line of dirt hauling wagons. At the present time the Trackson Co. manufactures two sizes of bottom-dump wagons, one size three-way dump wagon and two sizes of crawler wheels.

The new Trackson three-way dump has a body fabricated from ¼-inch high carbon steel plate and is especially designed for rock loading. The tops of all the gates are double flanged, and then reinforced to ½-inch thickness all around. As additional protection the side gates are topped with wood buffers encased in steel. The body floor is of the sandwich type, with finished hard oak between the top and bottom plates in order to cushion the buffeting of falling rock.

An improved dumping mechanism assures smooth operation even when the wagon is run over rough and yielding dirt fills. The hoist and dump are oversized for fast operation. The chassis is fabricated from steel plate electrically welded together into a box section, making an integral non-weaving unit which is essential to the satisfactory functioning of three-way dump wagons. A hydraulically-operated front end jack is provided as standard equipment.

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A Bituminous Material Tank Car Heater

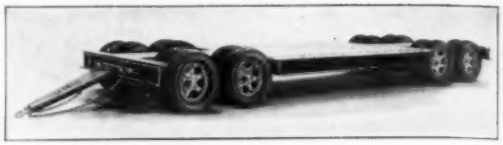
A TANK car heater for bituminous material which can be readily moved when necessary, quickly attached to the tank car steam coils and which speedily raises the temperature of the bituminous material in the car, has been developed by Chas. Hvass & Co., Inc., 508 E. 19th St., New York City. The tank car heater which is made in 2-wheel and 4-wheel models mounts a 30-50 horsepower horizontal water tube boiler of the down-draft type with fifty-six 2-inch water tubes of No. 13 gage locomotive coppered steel. The tubes are arranged with baffles so that the flame and hot gases from the burner make five passes through the length of the boiler around the flues before discharging into the atmosphere at the front of the boiler. The entire fire box is surrounded by water legs. The water line is well above the crown sheet. The inside shell is of welded construction and the outside shell riveted. The boiler is built in accordance with A.S.M.E. boiler code for 125 pounds per square inch working pressure. The water content of the boiler up to the water line is 134 gallons.

The Hvass Tank Car Heater

The burner for raising steam in the boiler is of the atomizing type manufactured by W. N. Best Corp., capable of burning all grades of fuel oil and other types of fuel of the same or lighter grade. The burner fires into a fire brick refractory chamber at the rear of the boiler. Air for operating the burner is supplied by a rotary roller bearing low pressure blower placed at the burner end of the boiler supplying 92 cubic feet per minute of air at 16-ounce pressure.

A New Tandem-Axle Machinery Trailer

A NEW tandem-axle LaCrosse trailer which retains all of the fully reversible advantages of the regular dual axle models has been announced by the C. R. Jahn Co., Builders Bldg., Chicago, Ill. The new design conforms to the axle load limits and trailer width regulations of most states. The trailer is under 8 feet in overall width, is mounted on pneumatic tires and is built in sizes up to 72,000 pounds capacity. It is fully reversible and can be towed from either end, thus eliminating the delays often made necessary by maneuvering to get in position or in turning around. Dual



The New LaCrosse Tandem-Axle Machinery Trailer

end steering makes it follow the turning radius of the truck and eliminates the dangers in swinging wide on the curves. Braking at both ends assures full control at all times. The wheels roll on heavy-duty Timken bearings and the platform is supported by a series of heavy freight car type coil springs, a feature which permits the wheels to follow the contour of the road surface without disturbing the level of the loading platform. The loading platform is flat and no excess weight is wasted in providing for heavy steering turntables. Loading can be done over either end, or side and skid ledges are provided.

A New and Larger Walking Dragline

THE size of the various levee and other projects requiring large scale excavation has constituted a definite challenge to the manufacturer of excavating machinery. To meet this demand the Bucyrus-Monighan Co., Chicago, Ill., has developed a new 10-yard walking dragline with a 160-foot boom. The structure of the Bucyrus-Monighan 10-W is similar to other machines produced by this company, but is greatly strengthened to meet the much higher stresses imposed by handling such a large bucket on a long boom.

A feature which is very important to the operator and owner is the location of the operator's cab. This has been elevated high up in the front right hand corner, and gives the operator an unobstructed view of the bucket and the work. The walking traction of the machine operates similarly and is as easily controlled as on the smallest Bucyrus-Monighan walker. The walking traction shoes are raised high above the ground while the machine is excavating, during which time it rests on an independent circular base of large area.

The direction the machine is to travel is changed, while it is standing on its circular base, by simply revolving the swinging platform to which the walking shoes are attached. The shoes, elevated above the ground, are thus pointed in the direction it is desired to move, the walking mechanism starts operating and the machine moves off in a direct straight line toward the desired position. Bucyrus-Monighan walking draglines are sold by the Bucyrus-Erie Co., Department LA-2, South Milwaukee, Wis.

The New Bucyrus-Monighan 10-Yard Walking Dragline

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These Catalogs Are for Free Distribution to Contractors.

Up-to-the-Minute Points from Manufacturers

Check These Lists Each Month and Write for Catalogs You Need.

A New Shovel, Crane and Dragline Catalog

395 National Equipment Corp., Milwaukee, Wis., has recently issued a new catalog on the No. 601 Koehring shovel, crane, pull shovel and dragline. Copies of this catalog NK-78 on this heavy-duty machine with gasoline, oil, diesel or electric power may be secured direct from the manufacturer.

Curing and Protecting Concrete

396 A 4-page folder describing and illustrating the use of Sisalkraft, a combination of pure asphaltum, crossed sisal fiber reinforcement and surface sheets of heavy kraft paper, for curing and protecting concrete surfaces, such as floors, roofs and paving, may be secured by those interested from the Sisalkraft Co., 205 West Wacker Drive, Chicago, Ill.

Equipment for Contractors

397 The line of Case Crane & Kilbourne Jacobs Co., Columbus, Ohio, which is of interest to contractors and includes various sizes and styles of wheelbarrows, concrete carts, hand trucks for handling bag cement, drag scrapers, wheeled scrapers, and cars for industrial railway, is described in Catalog No. 16 which may be secured by interested contractors direct from the manufacturer.

Rock Hammers and Screw Feed Drifters

398 Two new bulletins have recently been issued by the Worthington Pump & Machinery Corp., Harrison, N. J., describing Worthington rock hammers of the horse shoe and sleeve valve type in wet and dry patterns, and also the Worthington screw feed drifters of the horse shoe valve type for light, medium and heavy duty.

A New High-Speed Surface Grinder

399 The Mall high-speed floor and border grinding machine equipped with a 20-gallon water tank powered with an electric motor or 6-horsepower air-cooled gasoline engine for highway grinding is made by the Mall Tool Co., 773 So. Chicago Ave., Chicago, Ill., which will be pleased to furnish complete information regarding this high speed tool.

Steel and Concrete Bridge Floor System

400 The Truscon TeeGrid floor system for bridges, sidewalks and also for heavy-duty floors for scale platforms and warehouses is manufactured from structural tees placed side by side with the flanges welded together and with triangular cross bars pressure-welded into the top of tee stems and the holes filled with concrete. This system increases the strength of the slab and decreases the dead load. A handbook on this system may be secured by those interested from Truscon Steel Co., Youngstown, Ohio.

Detachable Rock Drill Bits

401 Ingersoll-Rand Co., 11 Broadway, New York City, has announced Jackbits, which are detachable rock drill bits to replace conventional bits forged on the ends of drill steel and designed particularly for small contractors, quarries and public utility companies where the operation of a sharpener and blacksmith shop are not warranted or where the handling of machine-sharpened drill steels is unusually difficult or expensive. Prices and details may be secured from the manufacturer.

Four-Drum Power Control for Large Wheeled Scrapers

402 Complete information regarding the new four-drum power control which makes possible the handling of two cable-controlled 11-yard scrapers behind a single tractor with both scrapers operated by the tractor operator may be secured from R. G. LeTourneau, Inc., Wilson Way at Roosevelt, Stockton, Calif., pioneers in developing cable-control dirt-moving machinery.

Crushing and Screening Plants

403 Pioneer Gravel Equipment Mfg. Co., 1517 Central Ave., Minneapolis, Minn., will be glad to send to interested contractors complete information on the Pioneer crushing and screening plants for producing ¾ or ⅝-inch minus material. Features of the Pioneer Duplex plants are the closed circuit, 28 feet of screening surface, and the primary jaw crusher and secondary roll crusher in a one-unit plant.

A Rubber-Tired Barrow for Concrete

404 Full information regarding the new Lansing contractors' wheelbarrow F-25 with a tray capacity of 5 cubic feet and which will handle 4 cubic feet of sloppy concrete without spilling and which is equipped with 16 x 4-inch pneumatic rubber tires may be secured from the Lansing Co., Lansing, Mich.

Automatic Water Weighing and Measuring Tank

405 Complete information regarding the new Blaw-Knox automatic weighing water tank which is used for the accurate measurement of water in concrete mixing plants and which solves the difficult problems which contractors have faced in finding a means of measuring water automatically and accurately and at the same time making it possible to set to different measurements quickly and simply may be secured from the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa.

Buckets for Contractors

406 Complete information on Hayward orangepeel buckets for digging compact, heavy and hard-to-penetrate materials such as clay, dense sand, large gravel and rocky soil may be secured by interested contractors from the Hayward Co., 32-36 Dey St., New York City.

A 20,400-Gallon per Hour Self-Priming Portable Pump

407 A new 3-inch self-priming centrifugal pump capable of handling 20,400 gallons per hour on a 5-foot suction lift and 9,000 gallons per hour on 25-foot suction lift and mounted on a wheelbarrow frame to provide utmost portability is described in a new circular "The Babies That They Cry For" which may be secured from the Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis.

A Wheeled Roller for Asphalt Work

408 A new surface roller of simple yet revolutionary design, 36 inches wide and giving a pressure of 100 pounds per contact inch and which is mounted on rubber tired Timken bearing wheels, is described in the literature of the Wheeled Roller Corp., Smith-Young Tower, San Antonio, Texas. By reversing the tongue, the wheels of this roller are brought in contact with the ground for rapid moving.

Hand-Control Graders

409 The Austin Western Road Machinery Co., 400 No. Michigan Ave., Chicago, Ill., has issued a new series of three bulletins on Austin hand-control graders as follows: Bulletin 1288, the Austin No. 8 grader; Bulletin 1285, the Austin No. 12 hand-control grader, and Bulletin 1287, the Austin No. 10 hand-control grader.

Waterproofing Under Pressure

410 Complete information regarding the use of Sika, a waterproofing compound which is mixed with portland cement and applied either under water pressure without removing the pressure and where there is no water pressure or using the integral method in which it is mixed with gauging water, is described in literature which may be secured from Engineering Department, Sika, Inc., 1943 Grand Central Terminal, New York, N. Y.

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The Blaw-Knox Hydraulic BULLDOZER--

—moves more dirt at less cost.

The rigid box type construction conserves tractor power by an amazing reduction in Bulldozer weight without sacrifice of strength. Easy and quick to put on—two way control, with positive downward pressure on the curved digging bowl—speedy bulldozing.

The hydraulic power which operates the digging bowl is concealed in the sidearm—away from dust and dirt.

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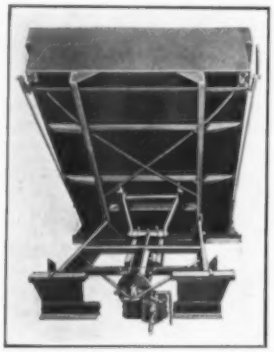

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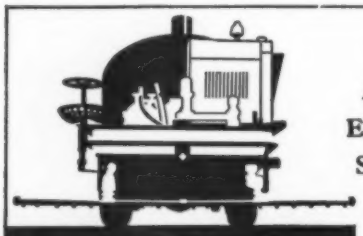

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Up-to-the-Minute Points from Manufacturers

(*Continued from page 42*)

10 to 13-Yard Crawler Dump Wagons

411 Bulletin C6 describing Trackson 10 to 13-yard crawler dump wagons, the features of which are strength, long life, durability, easy running and economy and which are equipped with double-linked 20 to 25-ton crawler wheels with 20-inch track shoes to carry the load under all operating conditions, may be secured by interested contractors from Trackson Co., 1320 So. First St., Milwaukee, Wis.

Concrete and Highway Surfacers

412 The latest loose leaf catalog of the Concrete Surfacing Machinery Co., 4559 Spring Grove Ave., Cincinnati, Ohio, contains complete descriptions of Berg concrete surfacers and Hi-Way surfacers with attachments and accessories for surfacing, cleaning, polishing, shipping, bush hammering, channeling and drilling concrete, stone, metals and all other hard materials.

Forms for Concrete Road Work

413 Metaforms, the rigid road rail for concrete road work, among the features of which are permanent rigidity, five auxiliary stake holes, heavy stakes with mushroom heads and pointed tips, sure-grip stake-wedges which are fastened to the box and cannot be lost, a 6½-7-inch base to prevent sinking and smooth joints, are described in literature which the Metal Forms Corp., Milwaukee, Wis., will be glad to send on request.

A Power Pump for Asphalt Emulsion

414 The Kinney Mfg. Co., 3529-3541 Washington St., Boston, Mass., will be pleased to furnish information regarding its new small pumping unit for applying cold patch and asphalt emulsion under pressure directly from the drums to the road.

Cement-Bound Macadam Pavements

415 The Portland Cement Association, 33 West Grand Ave., Chicago, Ill., has published a new booklet on cement-bound macadam which contains sixteen pages of text and illustrations. The booklet gives the history of cement-bound macadam in both Europe and America, describing one such pavement in Scotland which is more than sixty years old and still in service. Recommended design and specifications for modern pavements are also included. This booklet may be secured free on application to the Association.

A Heavy-Duty Digging Bucket

416 Jos. F. Kiesler Co., 938 W. Huron St., Chicago, Ill., will be glad to send to interested contractors complete information on its digging bucket which is especially designed for digging blue clay, hard pan, deep dredging, excavating, handling large size compact crushed stone and general rehandling purposes.

A New and Larger Diesel Tractor

417 Full information and specifications covering the new Caterpillar Diesel Seventy-Five, the largest and most powerful tractor in the Caterpillar line, may be secured by writing to the Caterpillar Tractor Co., Peoria, Ill.

Portable Tank Car Heaters

418 Cleaver portable tank car heaters, which are built in four sizes with steaming capacities of from one to four cars, are mounted on both trailers and trucks and can be used for thawing culverts and manholes and steam cleaning machinery and trucks as well as for heating tank cars of bituminous materials, are described in literature which the Cleaver-Brooks Co., 440 No. Plankinton Ave., Milwaukee, Wis., will be glad to send on request.

Expansion Joints for Concrete Paving

419 Carey Elastite expansion joints, the "sandwich joint" for concrete paving which is designed to protect the paving against expansion and contraction stresses, is described in literature which may be secured from the Philip Carey Co., Department E-1, Lockland, Cincinnati, Ohio.

Blasting Supplies

420 Complete information on Hercules blasting supplies and suggestions as to the type of explosives which will meet the requirements of your job most efficiently may be secured by interested contractors from Hercules Powder Co., Inc., Wilmington, Dela.

Corrugated Pipe for Drainage Purposes

421 Gohi Culvert Manufacturers, Inc., Newport, Ky., will be glad to send to those interested complete information on Gohi corrugated pipe for drainage purposes, which is designed to resist the pressure of shifting earth and setting fills and has the flexibility to withstand freezing water and the vibration of heavy traffic, and resistance to rust.

A Heavy-Duty Road Rooter

422 The new five-tooth Galion heavy-duty road rooter Model G-7950 which cuts from 1 to 12 inches in depth and is controlled by ropes to the tractor operator's position, is described in leaflet No. 152 which may be secured from the Galion Iron Works & Mfg. Co., Galion, Ohio.

Constructing Long Life Asphalt Pavements

423 Barber Asphalt Co., Philadelphia, Pa., has issued a new booklet, "The Toll-Gate is Gone—But", which describes the construction of long-life pavements with Native Lake asphalt.

A New Line of Heavy Oil Engines for Construction Service

424 The Waukesha Motor Co., Waukesha, Wis., has concluded license arrangements with the Hesselman Co., of Stockholm, Sweden, for the American rights under the Hesselman oil engine patents and will manufacture a line of heavy-duty oil engines for truck, tractor and general industrial service, producing an engine mid-way between the automotive diesel engine and the gasoline engine. Complete information may be secured direct from the Waukesha Motor Co., Waukesha, Wis.

A Crawler Welder

425 A crawler welder 18 feet long, 30 inches wide and 36 inches high, which runs 1½ miles per hour and which can climb practically anything that a wartime tank could tackle, has been developed by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Its generators furnish electric current for welding and for driving other electric repair tools. Complete information may be secured from the manufacturer.

Up-to-the-Minute Points from Manufacturers

Dump Bodies with Hydraulic Hoists
426 Literature describing Hercules dump bodies and tubeless hydraulic hoists which have a number of features and are designed for 1½ and 2-ton trucks may be secured by interested contractors from Hercules Products, Inc., Evansville, Ind.

A Complete Line of Crushing and Screening Equipment
427 The complete line of Kennedy crushing and screening equipment, including gyratory crushers, ball bearing gearless crushers for fine crushing, steel frame and roll jaw crushers, hammer crushers, crushing rolls of various types and conical and vibrating screens, is described in Bulletin No. 16 which the Kennedy-Van Saun Mfg. & Engineering Corp., 2 Park Ave., New York City, will be glad to send on request.

A Self-Priming Self-Cleaning Centrifugal Pumping Unit
428 Bulletin No. 1 and Circular No. 26 issued by Gorman-Rupp Co., Mansfield, Ohio, describes G & R centrifugal pumps which will work on 28 feet of suction, are non-clogging, have fewer parts and less weight than most pumps, are self-priming, self-cleaning and adaptable to all drainage purposes on construction work.

Steam-Jacketed Asphalt Buckets and Mechanical Primers
429 Hetherington & Berner, Inc., Indianapolis, Ind., will be pleased to send complete information regarding its steam-jacketed asphalt buckets for asphalt plants and also its Bulletin TL10 which describes the H & B all-mechanical time-locking device for asphalt mixers.

An Improved Stearate Waterproofing
430 Stearox 30 which contains two and one-half times the amount of stearate that has been supplied by conventional waterproofing pastes for the past several years, and effects a substantial saving in transportation, handling and mixing resulting in lower cost has been announced by the Master Builders Co., 7016 Euclid Ave., Cleveland, Ohio, which will supply details.

Triple-Action Leaning-Wheel Graders
431 General information and specifications of Royal leaning-wheel triple-action graders are found in a looseleaf indexed catalog issued by The Firman L. Carswell Mfg. Co., Kansas City, Kansas.

A New Steel Expansion Joint
432 The Air-Lock expansion joint of the triple and double types, composed of sheet steel in any desired lengths and heights and styles required by different paving specifications with the air spaces filled with waterproofed paper of cellular structure held in place by clips, is described in an illustrated folder which may be secured direct from W. S. Godwin Co., Inc., Race and McComas Sts., Baltimore, Md.

Portable Cable for Electric Machinery
433 In Bulletin GEA-1728A the General Electric Co., Schenectady, N. Y., gives complete information regarding G-E insulated portable cable for all types of electrical construction equipment including arc welding units and electric shovels. This bulletin covers both Tellurium-compounded all-rubber jacketed cable and soft cotton and seine twine braided finish cable.

Underpinning Piles for Reconstruction
434 Hercules underpinning piles, which are tested cylindrical steel and concrete columns which transfer the load of a structure from the soil immediately beneath the footings to a deeper stratum of greater carrying capacity without vibration, without expensive plant shut-down and which provide additional capacity for wall foundations to accommodate new superstructure loads, are described in detail in a new folder recently issued by the Underpinning & Foundation Co., Inc., 155 E. 44th St., New York City.

Semi-Trailers for Varying Services
435 Dorsey Bros., Inc., Elba, Ala., will be pleased to send a copy of its recent circular on Dorsey all-steel trailers illustrating Model C with a fully enclosed fifth wheel and furnished in lengths from 14 to 24 feet and Model L of adjustable pole-type construction.

A Curing Blanket for Concrete Slabs
436 Westfelt curing blanket, made of a filler of jute fibres punched or needled through two layers of burlap which is coated with rubber latex making the blanket slightly waterproof and retarding the evaporation of moisture has been developed by Western Felt Works, 4029-4117 Ogden Ave., Chicago, Ill., for curing concrete slabs. A sample of Westfelt curing blanket and further information and prices will be sent on request by the manufacturer.

Modern Fast Safe Curing for Concrete
437 A booklet, "How to Cure Concrete," has been issued by the Dow Chemical Co., Midland, Mich., which completely describes either surface or admixture use of Dowflake calcium chloride which handles concrete curing thoroughly, easily and automatically at low cost.

Hard-Surfacing Welding Rods
438 Contractors are frequently faced wth making repairs to gears, sprockets, plow teeth and other parts of construction equipment which need a particularly hard surface. Amsco No. 459 hard-surfacing welding rods have been developed particularly by American Manganese Steel Co., 389 E. 14th St., Chicago Heights, Ill., for this purpose and the company will be pleased to send its illustrated literature with full data on request.

Form Ties and Spreaders
439 Sure-Grip form ties and spreaders of several types, which insure accurate form work which will not bulge while pouring concrete, are described in the literature of The Dayton Sure Grip & Shore Co., Dayton, Ohio.

Dump Cars and Skip Cars
440 The Chase Foundry & Mfg. Co., Columbus, Ohio, will be pleased to send a copy of its Catalog No. 400 which illustrates and describes the complete line of Chase dump and skip cars for industrial railway service for contractors, as well as turntables and industrial tracks.

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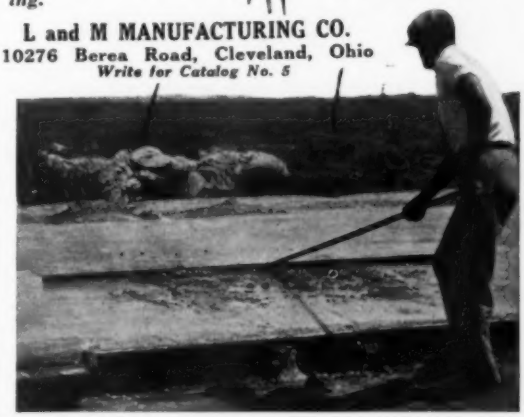

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